

#### Commodore VIC. 20

A fully liedged fully aspendible computer with large however Composie musec | High resolution graphics module available as extra Seaste BASIC Exp-to-use even for becamer New recorder Commodore approved augeller

#### Texas Instruments Tk-99/4 (PAL colour TV compatible)

Lineba Marativ within minutes of unpacking. Among can use if charts orachs, built-in music synthesizer silows you to build

notes and controls equation controls for mante sources. Designed for home management isociacional and entiritariment use. Large amount of educational software available on modules for youngeties. Programs can also be stored using good quality tipp reporter. Plazali Intervamente. advertised many life



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#### Bringshe landymusic an education amenument Account

acuno syntemeters air any apparatment agrouped with upper Street cases interest video full screen eating flour leay burson control 28 graphics kays. Programming tanguages. BASIC ASSEMBLER PILOT Programs can be staved on optional Ata-tape motoror. Atan appeared supplier.

Ateri 500 noonents comprehensive software forary. Modular depen

systematics in report of the second of the s optional Atan taps recover. Alari secretwel supplier

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### No. 4 FEBRUARY 1982

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AND VIDEO GAMES con be moried direct from our offices each month to	Garry Marshall has the details
ant for proceeding to COMPUTER AND VIDEO GAMES (Subscription Department) Competition House, Farradon Bood, Market Harborough	PRACTICAL PROGRAMMINGpage 72 Converting games from one machine to another.
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UE and Etre £10 00 Overseas surface mail £12 00	electronic board game set to itil aext Christman stockings
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Additional service information including individual overseas of most rates available upon request	DOWN TO BASICS
Published and distributed by EMAP National Publications Ltd	DOWN TO BASICS
Printed by Eden Fishel Goulderd Limited  © Computer & Video Gomes Limited  FSX 026: 3897	BRAINWARE
	Two boities of champogne and lats of knaos to be won is our regular competitions
Other Illustrations by: Elphin Lloyd ignes, inn Davis, Dorlan	SOFTWARE GLOSSARY 9000 84

## NEXT MONTH

Editor Terry Prott

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Cover: illustration by Steve Weston

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possione.

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and areade machines.

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pages of games programs for you to key-in to your machine. And you don't have to be a computer expert. Each month there's reviews of new computer and video games, regular pages on chess,

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Address

Computer & Video Games.
The magazine that

makes computers fun.

# MAILBAG

#### BBC Games

Dear Sir, 1 am about to buy a BBC Microcomputer (ANB BI) and 1 would be pleased if you could let me have sources of directly for readily adaptable available games software suitable for 32K RAM Colin Lindsay Chaley Lancs

Editor's reply: At the moment the only firm known to be producing games software for the BEC Microcomputer is Acom, the firm making the hardware.

The lettest word is that Act to the process of a grown arting some of the games currently on its books to run on the BBC machine, but these ore not expected to be readily a cardioble until Morch at the very earliest. I'm draid you will just thave to sit tight, or get to grips with programming and work on some of your own games Colin. Good luck.

#### PREMIER'S No. 1 FAN

Dear Sir, I was surprised to read your comments on the Premier Publications softwars. Ship of The Line. page 83, the of The Line. page 83, the of Your (or is it my) magazine.

I cannot speak personally of this game or any other ZXB1 software as I own a U K 101, but I can tell you of the service oftered by Fremer.

offeried by Fremen.
To date I have hrought
To date I have hrought
excellent mention.
"Cegman" added the new
Brase ROM. "Baule S' and
have joined the "CGLUA."
Experied to the CGLUA.
Fremen. I also receive a
free newletter which.
epart from describing the
range of games, ROMe and
hardware, also offers hints
and type on bow to expend
trom my machine. I am
also conforted to know



Do you have any views or comments on Computer & Video General II so we would five to be set from you We will also do our best to little exercise to any queries you may have or solve problems you may he a separamentage with your computer Please drop us a fine at Computer & Video Genes, EMMP, Durrent House, A Harrish Mill, Lendon ESMI, Soll II you have alteredy small as a sure which has computed to deep the computer of the compu

# that it my computer decided to "Shuffle off this mortal coil". Hen Premier offers a computer repair system. It I ever become lost within the ROMs. RAMs, address buses, clock pulses or software listings, then a quick phone call, during office hours, or the use of the customer phone in service.

nours, or the use of the customer phone-in service will put me on the right track quickly and efficiently. So, if on the very rare occasion that one of Premis's products fails to work correctly, then simply contact Premis's newly lift ind them the most height!

Peemar's products fails to work correctly, then simply contact Premier. You will had them the most belyful and triendly people and sasily Britains, it not the World's, best software company, without another company nearing the standard of their produce or service. Stephan Wood Stb. Croydon. Surrey

Editor's reply: We had suspected that this may bove been an isolated case. Stephen, but felt ones of these was an excuse for sending out a tope which box people actually talking on it. The author of Ship of the Line has sunce sent us another copy of the game and we look forward to giving it another try in the near future.

#### DODGEMS DODGE

Dear Sir.
Modifications to allow your
November Acom Atom
Dodgems program to run
without floating point
ROM:

A) 11125: remove "COLOUR 2;" 11250: remove "COLOUR 1:"

B) 20, 40, 80, 80; in each after "S = S + SGN (T'S);" to GOSj; S=S+K; and add 30000; K=T-S; FK=0

30000j K=T-S; IFK=0 III R 30010 IFK>0 K=1,R 30020K=-1:R C) During debugging.

remove end of line 19000 from '?16=... (Inclusive) Tom Boyd Holmbury St. Mary, Dorking, Surrey. P.S. D) 11125 should be CLEAR Z. not 3 — Congraphications on my

otherwise-high standard of hug-free code!

Dodgems author John Dyson replies: Thenkyou for your modifications for running Dodgems on a machine without the floating point NOVEMBER CAME EARLY

Dear Sir.

My main question is if I
could somehow get a copy
of what I think must be
your November issue.

That's the one I first saw, a
friend bod it.

rmean dod it.

I got down to the local
newsupents as fost as
possible, hut they already
had the December usue,
and thus had already sent
hack the others. After
searching oil ower I found
the situation was the same
alover. So I true!
of the beautiful ower is the
solid me his copy, hut no
doine his copy, hut no

So as a last resort I'm contacting you. Since I don't know bow much it would cost for you to mail ms a copy I couldn't send the money along. But if you can save me one and write and say so and how much. I would happily send the

I love your magazine and think it will do very well. I Although you can't take the suggestion of B. A. Moore maybe you could out comments beside the not-so-obvious parts of the programs to explain exactly what they do. Then people could translate the games into whatever language they are working in. That way only one set of comments would be language, Englishi I hope you can get me that copy. Colin Garrett Northcourt Avenue.

Editor's reply: We have had several enquiries about back issues. These can be obtained from EMAP National Publications Limited. Computer & Yideo Games Circulation Department. Reader Service. Bretton Court, Bretton. Peerborough. PSS 8DZ.

On your other paint.

Colin, we are picking out a couple of programs each tasue and giving a rundown on the variables and which parts of the program do what.

# MAILBAG

#### SARGON FOR THE SHARP?

Dear Sir,
I have a Sharp MZ-90K 48K
computer and am
interested in obtaining a
class program for it ideally
Sargon II. I have been
unchle to find this program
for the Sharp and
wondered if you know of

wondered if you know of anyone producing it for my machine.

Alternatively could you let me know how the chess program that Newbear Ltd.

Newbury, Berks, have compares with Sargon fl. lenjoyed your lirst magazine, although t haven't managed to get "Hanaman" working yet

and look forward to your next. ] Hunter, Hove Edge,

Brighouse, W. Yorks. Editor's reply: I'm sorry to have to report that chess games for the Sharp

Editor's reply: I'm sorry to have to report that chess games for the Sharp MZ-80K are few and far between, There is no Sargon II available for the machine although Sharpsoit hea written a version hut the copyright to owned by Hayden Books who are unwilling for Sharpsoit to market it.

Sharpsoft does market its own chess game but it is only for beginners. Experienced players would soon find the game unchallenging.

Newbear's chess game is not as demanding as Sargon II either, and although it is not directly aimed at beginners the hulk of sales is made up of inexperienced players and children.

#### ATARI'S FAME

Dear Sir, Congratulations on your first issue of Computer & Video Games which certainly fits more into my own microcomputer aspirations than any of like other more business oriented publications around. Many of you may have that for castict deviations through ear readar enquiry service. Unfortunetely, due to the messive needer response we have not been able to process all of these. If you filled in a card and stift have not heard from our advertisces, we would suggest you contact the company concerned directly. We are sorry for any inconvenance but nethody costd have practicated the phenomenant response we recursaved on ear first three issues.

I am a keen computer games player, and writer, although I only presently own a Sinclair ZZBO. I am looking atound to buy myself a new computer and have heard that the Atari duo have hy far the best graphers facilities—although I have never seen either of these machunes in

action

Could you please tell me
if the Atari 400 and 800
graphics are more
impressive than other
machines in a similar price
lange — and if so why
aren't other manufacturers
using a similar system?
Joseph Sandráge.
Chelis,
Stevenoge,

Editor's reply. The Atoric computers cortainly bave good graphics characters, and the games ROM pocks that plug into the system use these to their best of characters. However, the highest resolution of the Atori system is 250 × 152 points — or picture a sements (pictals, This is quite occupations). This is quite occupation of the continuous and the continuous continuous and the continuous cont

Herts.

respectively. Other manufacturers do use high resolution graphics - in up ta 18 coloure. Notable among Atari's competitors are DAI with the PC.1' costing £595. This has more memory than the Atari 800 - 48K compored to 16K - and has even more pixels -335 × 255. Unfortunately It has only a small amount of very good software. Texas instruments have recently reduced the price of the Tl 99'4a to around £300. This has a similar specification to the Atari 800 - and has the capability of superior graphics because of the use of a 16 htt processor. compared to most other systems' 8 blt.

As you can see I have only scratched the surface and more systems are coming onto the market all the time. The VIC-20 and BBC Microcomputer will also give the Atari 400 a run for its money — and both are cheaper. You can see that it's more difficult than you first thought.

Get friendly with your local decier, and find out what support he'll give you. Compare dealers, if you have a choice, and then look at software availability and cost. Only you can evaluate all these factors yourself.

#### MASTERING THE MACHINE

Dear Sir,
Thank you for an
interesting new magazine,
it seems to lit the gap
between the

semi-professional format of the home computer user and the "toy" market, I have an Acetionic MPU 1800 Video Games Centre with a variety of

preprogrammed curindges.
The one cortridge that is programmable is the Hohby Module but, open from the few programs they supply in their instruction manual, I comnot seem to moster the machine code that is needed to operate

1t, can anyone help?
The maker of the chip, a
2650 by Mullard, had
produced a hock hy S. J.
Op Het Veld entitled
Microprocessor Controlled
Vadeo Games hut e now
out of print and no hope of

you know why I need help. I have solved your octagon puzzle the 'old fashioned' way in about 15 minutes. If I had a proper computer I would, somehow, work out a program in order to arter your competition for the Yuc 20 you are oldering, I

If any of your readers can help me find any programs for the 2650 chip, or has a copy of the book above, I would be more than grateful. J. F. Baldock

Ashford, Kent.

Our expert replies: concerning you prohlem with the Acetronic MPU 1000 Yidea Games Centre. You rightly state that the chip is a 2550 from Signetics. made hy Mullard. This is a general purpose microprocessor with a 75 code instruction with a 75 code instruction

I am afratd I can find no information on the hook Microprocessor Controlled Video Games by S. J. Op Het Veld and can only suggest you try the public library. If the book was an sale in this country then the Central Library will have a copy.

have a copy.

On the other hand,
Mullard produce a data
sheet and Signative a
complete family booklet,
both available from
Mullard at Torrington Place
is London. Both include the
complete Instruction set
hat you may have to
consult a separate book to
understand how to use the
different addressing
modes.

#### MOLE GOES DOWN

Dear Sir.

I have entered your Mole program and it is a very enjoyable game but I cannot get a score and feel there is a mistake in line 25 which I cannot enter

successfully.

Can you help?

I have entered the other two Sincian games in your fanuary issue and

found them most enjoyable.
Congratulations on an
extremely impressive
magazine

magazine
D. Johnson,
Croydon, Surrey

enjoy the game.

Editor's reply: A hug eltpped into this program which had to be typeset. Line 25 should read: 25 LET R = PEEK (PEEK 16398-2268" PEEK 16399) We apologise for the mistake and hope you



GONE ON THE GREEN THINGS

Dear Sir,
Many thanks for a
wendorfully different
magazine. I was
particularly impressed with
the wey you have the to
the work of the

magazma on their own. Among the other artwork, I thought the most improssive were the strango crectuses which were used to illustrate the Acom Atom's Green Things game I look forward to seeing more work by your providence, and the lutter, water of the seeing more work of the seeing more of the seeing more work of the seeing more of the seeing more work of the seeing the seeing more seeing the seeing seeing the seeing seeing the seeing seeing

#### BOGGEO OOWN IN ACTION

Dear Sir.
For just over a year now
my friends and I have been
making up a variety of
arcade style computer
games on the school
computer (an Apple II 48K
Europlus).

The main problem with these games is that the more action, altens and obstaclos the more bagged down and slower the program gets. This causes all moving shapes to

flucher somothing terrible. Obviously what is needed is machine longuage routines, such as these used in Bill Budge's Penny Accode where the ball does not fluckor and will baune off anything that is not black. The information to make up similar routines is sadly dissent from the evaluable Apple manuals and so I must seek your belp.

At the moment the shapes for our games are stored on disc, separate from the programs and are leaded and addressed by an exec program which is fine for me, but not for loss knowledgeable people who just run the program and expect it to work.

We do have programs which will load the shapes when asked but the addressing causes interference with any inputs immediately

collenwords.

Naturally the direct
POKE-ling of the shape
table late the Apple
memory in the first issue's
Num program interested me
and I would be graciful if
you could tell in he how the
outhor achieved this and
how shape tables can be
made without all the
happy named and the
happy named and the
happy named and playing
diagnams, vectors and
hexadecural numbers.

t think your magazine is just what the computer industry needs and I hope to contribute some of my program Instings in the near future.

Neil Forsyth Naim
Naimshire
Scotland

Garry Marshatl: The high resoluttan shape tables. avaltable in Applesoft, are precisely what you need. As lar as "messing about with the binary numbers" is concerned, you have to do it that way, because that is the way it works. Actually, it tan't at all difficult to do, once you have got the hang of tt. I don't think that you would expect to get rapid moving graphics effects without expending a little effort. The graphics effects can

be reatly spectacular: once

the shape is entered. Applesoft permits it to be drawn, erased, scated and sotated with a minimum of programming ellort. Watch the Graphics page for further details.

#### A SOFTWARE SENSATION

Dear Sir.
To my mind, people are attracted to arcado games subconsciously, for they often get out far more than they put into these

they put into these computers. Stattlesone. It cought my eye in a fish'nchip shop because of the XY monitor with vector score, and the piodignous computer gets through in sect time. In case you haven't met it. If a fine in the piodignous monitories of the XY monitor with vector computer gets through in sect time. In case you haven't met it. If a fine in the interest in the computer of the interest in the interest met in th

to distout targets.

A kund man let me mend
one. There's a 6502 riding a
12K program, plus four
custom hit-slice chips
doing 16 hit tragonometry,
omong the 150 other
support devices. She
certainly puts out more
certainly puts out more
of the backdoor from NASA,
Boeing and Lockhead.

Thought your readers might he interested. Josethan Pope Chesterton Road, Cambridge.

#### TAINTED BY TINTS

Dear Sir, t have just copted a program for solving Rubik's Cube from your magazine, and I think you may be

interested in the following remarks on the d presentation of this kind of

material,
I presume you wish your
readors to get the
programs in your magazine

little trouble as possible. A clour and accurate printing is therefore required. I know that many microcomputors are provided with poor printers, and that accuracy demands that you print by some photographic process from such output.

from such output.

I am not coursined an individual however, that you an not adding further of the nest and the programs of the programs are printed. The dark give on light grey technique of page 62 is particularly throublesome, the pictures on many of the pages are also distracting Fortunately I did not have to contend with printing on the silent, or with a program of which occur elsewhere.

presentation is of course on admirable aim, but if you want your readers to enjoy the programs you publish and buy further copies of you mogazine I feel you must make copying the program more easy.

D. Bond

A lively pictorial

D. Bond Kesgrove, Ipswich.

Editor's repty: Thank you for your comments Mr Bond. We do appreciate the difficulties of keying in programs, especially the long and complicated cass. We do toke great care to ensure that when cotoured thits and pictures are placed over piniout, that the symbols can still be seen clearly.

Hyou find them a distraction I suggest you use a ruler (or, dare I suggest, a temptate) to keep your place in the listing. Our atm is to keep the listings bath readabte and presentable.

## NEW PRODUCTS NEW PRODUCTS NEW PRODUCTS N

#### **EAT AWAY** A HIGH SCORE

The Munchis Man's appetite is of a fund common among readers of slimming magazines He digests without discomfort

and travels around your Acoin Atom screen consuming dots as fast as he can. But he has anamias, four ghosts, whose aim is to put a stop to the rovenous creature by sating him up. In this version of the arcade

came Puckmen or Mazemen, you play the part of the Munchia Man and score points for a very mores!

Bonus points are accumulated by sating the avil meaning when . the tables are roversed. This is achieved by gulping down one of the flashing spots in the corners of the screen, which gives you the energy to chase and eat the meanies for a few brief seconds

Program Power are the supplears of the game which runs on a full mamory Acom Atom and Will cost £4.95 for a cessette Parhaps at could be good avaiston the rapy for a slimmer

#### TAKE A **BALLOON TO** THE TOP

#### THE GREAT BALL



A £50 pieze edds to the accortive of mastaring the Great Balloon

Race and notching a top score Manchister based Mr Micro have put up the monoy for the person who can bast guido a belloon around a course on the Pot or VIC-29 computers Among the lethel hereids on the course are flowers, trees, and a fance.

You acore points for the distonce you manage to guide your ballong

Tho mekor has come up with an ingellious idea to varify each antrant's score Spacial charactere lissh up on the screen to represent a perticular score. The race finishes on 14 Detabai 1982 and the cassatta costs £16



#### EMPIRE STRIKES RACK

Join the lorces of the tyrannecal a tank and the Empire goos down Darth Vades, waging wor against on numbers the rabels who dare to oppose Your five Walker Tanks are in

In Empire Strikos Back you see given commend of a squedron of

leader Derth Veder if you fose

#### LUNAR RESCUE MISSION

A stranded tribe of luner cree

tures in feer of their lives look to you for an ascape route As commender of the mothership hovering over the surface of the moon, your brief in Space Rescue is to save the moonies. or pods, as they are usually known. A special landing craft

carried by the mothership is unda i your control and struggling against the relentiess onelaught ol a meteorite storm. You have to lend the craft on the moon's surface and pick up five gods, at the same time blast-

ing the rocks to emitherance After each pod is rescued you must take him back to the mothership Points are scored for pod pick

ing and meteorites destroyed Altogether you get four lives to play with and there are nine skill lavals to try out - and sound affects too. Available now from Pat software specialists Supprisoft, it runs on an BK machine and costs £8 plus V A T.

#### A DASH OF **OUTER SPACE OIPLOMACY**

STARSHIP COMMAND the beginning of the game and Combine Startisk with the way game concept, add a desh of

Diplomacy and you'll ond up with Starship Command The game is sot in a spacecraft which gatiols the calaxy, sanking

out a namy space craft and keeping your alkos on the right side In front of you is a three dimensional view of the galaxy divided up into pundients. You must shoot down enemy ships while evoiding that hip

But you are also in contact with other planets, some pi which are hostile and others friendly Your tob is to boost tho morale of your aupporters to stop thom changing sides and going over to the enemy

It runs on the Nascom and costs £9.95 available from Program Power of Leads

the Empire pursuit of the rebels and you must shoot down their sincisft.

> stert ogen The Walker Tanks are precess

usologs heap

their troops and finely the rebal

base itself if you lose a tank in

combat, the one taking over car

use on whose the other left off. so you don't have to go book to

ous in thou movement and you

must be careful not to stop them

whon they are in an unstable

position If you do the Walker will

keel over and collapso into a

check how far away the Walker

Tanks are from the robal base

and you can also spot anamy

positions on your radar scanner

Incorporated on the screen is

a work cycle mater which when

completed, either generates

more analoy for the Walker, or

carries out any repris the tank

Supplier of this game is Tandy

software specialist Molimers of

Sussex It can be yours for £10.05

(including VAT) and runs on a 16K

Tandy TRS-80 Lavel II

Throughout the game you can

Walker Tanks, which look like came is but or a made of motel and seed ledded with fethal feest You answer to the menacing

# EW PRODUCTS NEW PRODUCTS NEW PRODUCT

#### BURIED AND DEAD

#### AL DE

Old fashioned pick and shove! work is the only way to rid you planet of a strange new bread of

In Alien, the action takes place in a maze, intitrated by longy beings, whose eim is to hunt you down and eat you.

Your only excuse is to dio holes in the labouraths of the mass blocking the hungry consforces' way. When they fell into the holes you have dug you must hover assiby and fill the hole in over their heads

The elens are surprisingly soils and in a flash thay can hop out of their potential coffin and est your man up in one fell swoop You get points for the number of avil meanies you succassfully bury, and it you wigh one frame clean of them you gat the chance to have enother go at a new frama

Alien will run on a VIC-20, and makes use of the machine's high resolution grephics It can be vaurs for £19.95 from Commodore

#### RACE AGAINST THE CLOCK

#### DUPER RACETRACK

Onvine round a rece course at top spend is a test of concentral tion and skill to stay on the track and take the chaquered flag in Super Becetrack

This game is a race against the clock with the object being to break lap and race records. There is plenty of variety in the course selection so if you start to anticipate the haupen bands on one track, try another Steer the car around the

conrss keeping clear of other cars and the burners bordering both sides of the course At the start, the car appears on the bottom of the screen but

when the race is underway, the track amolls before you on the встеел

This Acorn Atom cartridge is reasonably pocad at £4.95 from Program Power of Leeds.



#### A JUMBO SIZED JOB

#### 747 FLIGHT

Passangers and craw of a 747 Jumbo Jet ere in your hends on e Right to land at England's busiest suport Heathrow

The huge erroreft is eplely in your command as you fly in the pilot's hot seat through the subnrbs of London When you have located the position of two Hesthrow runways you must start the descent and safely land the erroreft Just how good a pilot you are will be revealed once you have completed the landing - as you receive points

for mirmanship Bug Byte's 747 Flight runs on an Acoin Atom and was actually written by a Jumbo Jet priot for the Liverpool softwere supplier,

so it ellins top marks for its realism On the screen you are con-

fronted with venous liquies representing eltrtude, the state of the undercurreds, a compass, the rate of climb in feet per second, the sound of the aucrest in knots and the angle of the flaps in degrees, to name but a

To help you on your flight, a map of Heathrow's environs has been included with the game. On it are marked the 10 stations (six of which are close to the two runways) and possible flight paths.

All 12K mamory is needed to run this simulation game and it costs E8

#### INVADERS NEW ONSI AUGHT

#### INVADERS

Blast away at a fight of attacking up of three rows of envenionen the posleught of less beens.

With four protective shields to amtest your ship from the reging torrent of enemy fire you man ourses the base to the left and night of the screen. Keep up a constant stream of shots to destroy each tleet, but don't expect to end up on the winning side

This 16K ZX81 version of space speed screen action with a fleet form with instructions costing of inveders numbering Zt made 79.00

prestures in detence of your tures each. Extre points are home base while niftily avoiding gained by hitting the flying sourcer at the top of the screen.

Invaders costs £4 from Bnd Byte of Livermont which her also just brought out a new chass game for the Acord Atom Bug Byte says the game's

strengths lie in its graphical rapresontation "It is cleared than most chess gemns in some there is confusion over the black invaders has been written in and white pieces' (t inns on a machine code to achieve high 12K Atom and comes in cassatte

WE HAVE TOUCHDOWN

#### SUPERLANDER

credgy hezardous surface of a strenge planet is no easy task and you need a steady hand at the controls

In the first batch of games brought out by Commodore Business Mechines for the VIC-20 your task is to successfully land your spaceship. Their but think sale landing sites to steer the ship towards A safe landing needs careful judgement and a

Landing a spacecraft on the craft, golding it ripwards, downwards, to the right and to the inft. An extra feeture is its power thrust facility II you want to build no speed the engines will be boosted by pushing the control joystick down

Points are awarded depending on the difficulty of the site you choose to land on Superlander is available now from Commodora



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#### NEW PRODUCTS NEW PRODUCTS NEW PRODUCT

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The computer organises the delence as the ermise of Austria. vous embitions

The power-hungry Emperor Napoleon, has since been hailed es "the first Enropean His aim was to conquer the

loud and master from his bullowed mother country, Frence To cerry out your task there

are six French ermies et vous disnosal

The computer's ermies start Butain, Spain, Portugal, Russia olf from their respective counand Prussia preprie to thwart tries except the Butish one which begins its mengripping from Ibene or Pressia, for agest of tions may ment

You begin the wers in Jone 1798, end have a time limit of 17 Verile imposed on you in which to complete Napoleon e embrison

Tippos take a long time to move being without last meens of transport. Weether conditions have to be teken into eccount when moving troops either into háttle or to a new camo location Historically Nappleon's big blun day was to make an aimy march on Russia in winter whan the

troops were ill-equipped to cope with the conditions

Napeleon is the appropriate nome of the name it inns on a Tandy TRS-80 in 16K and is eveil able from Molemerx. It is only out in tage form for the price of

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VICS HELP

#### TUNESMITH

Sary Numen has brought electranic music back into vague and now the Commodors VIC-20 is bunging similar sounds into your front Loom

All you need in the latest music nack called the VIC Tunesmith and you are ready to rock This piece of softwere will mnuess the musiciana in the family and make botter use of the

VIC-20's sounds facility Study the menual that comes with the mechine - there is a section listing musical notes complete with true notes fiet notes and sheins Each has a namber assigned to it which the compute) andarstends and by typing that in via the keyboard you can write your ewn piece of

Trinesmith has a capacity for 99 note melodies and you can edd in e sniteble drum beet end set the speed of the time von create. If, when you play it back. there are a few notes that make yon wince don't worry - there's a apacial aditing facility which allowe you to replace the out-oftune notes or delete them

From the VIC Centre, Tonesmith is a recent eddition to the VIC softwere range and coets

The wind speed changes to make the game more challenging es you have to judge the power beliend your shot accordingly, it

elso effects the direction Wetch out for obetecles on the course. There are awkward bun

kers and clamps of trees border the fairway You even have jent a-crowd on band to bolater your confi

dence when you hit a good patt but be careful not to knock them Golf is available for Nascom

machine e and has a price tag of £7.95



### FLIPPFR FLICKING **FOR THE FAMILY**

#### PINBALL

forest you own night machine design to make the most of your flippe)-flicking skills

Pinbell wizerds are given their chance to implove on sicade designs in the letest cassette for the new Tendy TRS-88 Coleur Computer

A feeture of the game is that yon can decide how many flippers you want, where they should be poetioned and how difficult or easy the finished game is and then try it out no the

Pinbali incorporates all the feetnies of the classic arcade name, you have to judge the best angle to hit the ball in oider to make the hest imminvement to your scare The game is for no to four

players and you can try it ont for you self at the Which Computer? Show in a competition which offers the Colour Computer as a

All the entry money collected will be donated to the Musculer Dystrophy Group and will be spent on more electronic aids for medical research. Hope's are high for piles of cash as the show organiser Clapp & Peliak is to metch the sum isised on competition entry less.

If you fancy a go the show is on Irom 19-22 Jannary et Birminghem's National Exhibition Contre The Pinball cussette coste £22.85 from year Tandy dealor

### HAZARDS ON THE **FAIRWAY**

#### GOLF

Holler "Four" of you hat a way word shot in the most recent polf game on the computer scene And then cross your highers and hope nens of the growd have wandered into the path of your

This is one of the hezarda in Program Power's Golf cessette. which strees towards new frontiers of fairway realism. The player is invited to take part in e championship goll tournement, he has an imposing selection of cinbs to choose from and a valuety of wind and ground conditions to overcome

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# COMPETITION

#### TEN WAYS TO USE A TEMPLATE

"A comb for Telly Sevolae," eaid G. D. Ray of Marlay, Wimborna in Derset and on e judge's whim he was newardad a prize. To give Mr. Ray hie daa, this ase of a templats was mora sensible than most of the idens we received.

inclinate velin ven Joe Minilary in a similar verin ven Joe Minilary in a similar tow spania is Suchle a nome and and user in en leskolen hell for Verligs Bett His van and tropical amangh for our judge, so instas di hackoes his second indes, that the template vould mother in great bare clarify tester. Puzziade Valla so war ave, but instructions: (1) place lesmipate in pint glasses. (2) Rend words in nd letters (3) Check against allowing chart Check against allowing chart Check against allowing chart personal control of the co

Yos it reelly works, impressed we deepstched a T-shirt to Nelson in Lance.

The byta-ing cyalicism prize went to Kaith Parker of Crook, Co Darham, whose astry raud: "(1) Take template Fold twice down length to prodace strip i" x 2°. (2) Wedge this under Sinclin' 15K RAM pack... prastol The dranded RAM pack wobble is cured — words fall me (sorry Unclo Cive, wa ell love you renlib love you renlib on the control of the control

Where does the cynicism come in? Well somewhere. The prize: one of our T-shirts.

Anthony Hood of Kilbarn, Darbyshire gave as a rhyma: "This piece of plestic, 3" x 1"; A computar shall be stuck thereon; So whan I pazzle, curse and list; I thinh of C.&V G., thu When we gave away a free template with our second issue, we little realised what strange perverted uses the poor defenceless pieces of plastic would be pul to.

Trained only in the art of helping readers to key-in our games program listings, the templates may be hordpressed to fulfil some of the tasks you planned for them.

Innocently we asked, "What other uses could you find for a free template?" And in implicit detail you told us! After we had Ihrown those out we were still left with a few bizarre suggestions and from these we picked our 10 lucky winners of Buas T-shirts.

The winning entries are presented below and should not be read by anyone who is feeling in a delicate state. Our judge has given up trying to explain her choice of T-shirt winners and is unavailable to anyone trying to contest the decision.



grantest; And nboal the T-shirt I won; With those lovable Bugs displayed upon; Otherwise I'll probably use it to sat the gap on my spark plugs."

And you thought Keets was good!
Anthony was our Greet McGonagal! Poetry priza — e T-shirt. Wa are currently investigating claims that
Anthony is a part-time Vogen space

ship captein
No such doubt axists in the case of
Kevin Etheridge — who traely admits
his alian origins. Apparently the tem-

plate was the answar to his drame, minish to get of this "dunphall of a world" and bach to his native planet. Kevin linked the templets into his Bambletrundito Esserator (mt. 4) via characteristic models to the service the quality of the characteristic models his to disappear into hyperspeco. Before he guest, Kevin will be henging on for his "Tahir et Dalegty Bey. Dankarndina — hi is a "large-ties" allen.

nlien.

O. R. Cowap of Letchworth, Herts come up with the nrtistic suggestion of a sing the template as a Ds-Bugging desire (Left)

Robin Hill came up with several enggestions, the most sonsible of which, was: "Mamorise this contour eo you'll recognise e straight line when you are one."

Mn claims his nddrass as: Tha Stress Office, British Aerospace, Brough, N. Humbersida

Removing the skin off old rice pudding, was the simple and prectical iden put lorward by Simon Hodgson ol Gatashaad, Tyna and Wear.

Jact to prove there is nothing sexist about this magazim (although all the Bage are mile) our penultimate winnor was Linda Evans of Burgasa Hill, Wast Sussax.

Linde reckons the template is ideal for ramoving her pet parol's little offerings from the energet—leaving no tracel Linde asserss us that the template is thoroughly wiped before being retarned to keying-in duty

And finnlly, Simon Young of Clapton, London E5, reckons Adem Ant sace a template to drew the moke up lines ecross his lece.

And if you think thase 10 were bind — et leest they were printeble. Wa hops we haven't given you too many ideas.

#### Brainware answers

The answer to our January Mind Routines is that the triangular pyramid has 4, 6 and 8 layers, which gives you 20, 58 and 120 balls

The square pyramid has 1. 5 and 7 layers which gives you 1, 55 and 140 balls.

The Nevera Crossword solution is printed right and we will publish the names of the winners next month.

This month's Brainware problems can be found on page 83.



# COMPUTER SYSTEMS FOR THE HOME & BUSINESS ENTHUSIAST

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navertheless, their guiding principle is to "steal first" and esk questions later. This offends your moral standards so much that you have no

hesilation in using your terrible spikes See them beam down and squswk. Sherpen up your reflexes

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The methodin are not only the continuous as so 2 ships as The methodin are not only the continuous and the continuous also encountered but reading personal, the photophone, also also encountered but reading personal, the continuous continuous with a good visual displey smable you so but effectively. Don't forget to contact your supply ship as runting out of fuel or simulation is rether embarraseing to a commander in line for Itle BRON CROSS.

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Use your megical powers to sley the bloodthirsty benshee, put an end to the deedly demon, or the goblin writing to weylay you

Walk through walls and seeled entrences, cast a spell to heel your wounds, regen your strength or hurl bolts of lightning.

A waard you ere, yee, but welch out for the evil Soicerer.

who is weeking to cest his levolution by the enrichment who is weeking to cest his levolution by the conget ulinese — to deprive you of your most valuable mapping. But all is not lest — you may regen is spell or two, or perhisps even one new loy you — if you can discover the wondrous touchstones, stone saturated with powers to restore your magacel eithlittes. Be werned too, thet not all

#### £15.95 TRS-80 & V G. (level II, 16k) cassette

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must be recovered from Kronus Ihe Demon.

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# CHISS

A common myth — especially among non-players — is list experi chessplayers and chessplaying programs somehow look at every possible variation in the game

A little onalysis shows that this cannot possibly be so, in the initial starling position for chess, White has a choice of 20 moves (16 pawn moves and four knight moves). Which ever move he plays, Black has a choice of 20

replies, making a lotal of 20 × 20 400 possible combinations of one move on each side, including such unlikely combinations as 1.P.QR4. P.KR4 and 1.P.KB3. N-QR3. For subsequent moves each side is likely to have perhaps 30 alternative choices



on average until quite late in the game. Thus we can reasonably estimate the number of possible ways of playing just the first three moves for each side by 20×20×30×30×30 = 324 million!

The so-called "combinatorul application" of compliance of committees the supplication of the greatest obstacles to writing clients of lag men playing programs. Nevertheless, it is extended belight to slort by thinking in Ierms of exhoustive analysis, stopping only when a position is a checkmate or a "delined" down (is stalemet or a delined "down (is stalemet or a delined "down is stalemet or a delined" and in the stalemet of the delined safe to checkmate for either and to checkmate or a delined "down is stalemet or a delined "down in the minimo control method to move selection, known as the minimo coloration. This is modified.

#### By Max Bramer

ified form, is used in vartually all programs to play chess, go, droughle and similor two-person games. It is easiest to illustrate the method by a simpler example han chess and I have taken the humble game of noughts and crosses as on example.

In the position marked 1, it as Xs. move and he has three choices shown as positions 2.3 and 4 Number 2 is resimilar and as well for X. In numbers 2 and 4 it is 0'S move, to positions 5.8, o'r 3.8. Position 6 is also terminal and a win for 0. Following every sequence of moves through to either ow in tot X. aw not 10. Or a traw gives the complete signer Movement of the complete signer Notice that quity terminal positions 3.8, 3, 10, 11 are labelled as a win or duss.

However, every other position can now be labelled (working from the bottom of the tree upwards) in a straightforward, way. Numbers 5 and 8 must be draws and 7 is a win for X since there is only one legal move each time.

New look al position 2, It is O's move and he can either move to 5. g draw, or 6 g win for O. Since it is O's move he will choose the best alternatives from his own viewpoint, in this case 6. So 2 is also a win to: O. In the same way 4 is a draw, since O will certainly avoid playing to 7 and losing. Finally consider position 1. Now it is X's move and the choice is between 2 (a win for O). 3 (a win for X) and 4 (a draw). He naturally will choose 3 and so the original position I is a winas is obvious al a glance - with

the best move being lo 3.

The same melhod would work equally well for any size of game tree, with any number of levels, provided the players move alternately, as they do in chess.

The first step towards a solution is lo extend the idea of a scale. Instead of just win, draw or loss, every position is given a numerical value, e.g. + 100 for a large White advantage, -3 for a small Black advantage (it is convenient always to score from White's viewpoint) Of course, this is much less precise and sequires a great deal of judgement to do even reasonably well (how does a week pown balance against a strongly centralised quieen?)

Just as in the noughts and crosses exemple, the score of the initial position being molysed can be computed by "backing-up' values, level by level. Figure leve shows an example, analysing ust one move for each side. Note that all scores are taken from White's point of view, so negative scores are favourable to Black.



The values -8, -3 etc. are scores assigned to the final posi-5 since a value of 8 is better than -3 or -2 from his viewpoint. Thus 2 has a score of -8 and similarly 3 and 4 should score +5 and -4, respectively, with Block always playing to minimise the score of the resulting position. From White's viewmaximise the score he can obtain, thus he chooses to play to 3, value +5, not 2, value -8 or 4, value -4 The same alternation of While maximising and Black minimising would again work with any number of levels and, not surprisingly, is called the minimax algorithm. Using the mtnimax algorithm does not solve the combinatorial explosion, since even looking two or three moves ahead for each side gives a vast number of positions, but it is an invaluable start.



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# VIGAMES CENTRES TVIGAMES CENTRES TVIGAMES

### **KEEP THIS VILLAIN'S BOMBS AT BAY**

Kahnom the Mad Bomber is an and the blocks double in length evil character who lives up to his

He miss the roost at the top of e well and has instant access to a cache of hombs which he diggs from a great height it's no to you to thwart Kaboom and literally wipe the smile off his face. For each time you let a bomb hit the cround it brings a wicked grin to his face

This Activision custinge fits the Aten VCS and has an addic tive onelity making it haid to gut down. At the bottom of the screan are three blocks which you can move about with your paddle controllers.

Kaboom moves exertically from one side of the screen to the other and drops a same of bombs with lighted funes which

you catch with your black At first the homber moves slowly so there's no problem catching the bombs but as the gama prograsses Kaboom really dees on mad making it a hard job

for you to teckle There are two options to very making your task easini

Although the gnty skill in play ing the game is having a quick hand to move the block scross the scienn it is an extremely compulsive reaction game The points system is simple

one point for each bomb, but the score can quickly mount up Kaboom the Mad Bomber will terment your life los £18.95 from Autorisien UK distributers



#### PITCHING FOR WORLD CUP PLAY OTBALL AND ICE HOCKEY

Football funs are in ion a good with the joystick and you use the ome next year with the World fire or action button to shoot Cua in tall swing

Games centres are well catered for on the football front, the latest to edd one to its innoe is Philips for the G7000 in this version the match is longht out between two five men trams such complete with a goalse The man are moved around the prich

You need a pond eve for a bat and an alert mind to chuck at an

instant where members of the opposing term inc. If you want to pass the ball to another player just press the line button, but be caretol not to lot it be inter cepted by the opposition

The computer memory kengs track of the score and also clocks up the turn left to play When the action gets a bit violent and players suffer a lew blows, the

this curtiidge with the added pama Ica Hockey included in the package. The principle of the onme aticks closely to the insione, but the speed of the buck's movement is not as fast as the

the computer and the score los both sides is marked up on the scieen too Both games inn on the G7000 and can be bought now for the standard Videopec

above you which are four lavers deep On either side of these layers the walls hem you in so von are truly trapped

ANOTHER **BRICK IN** 

THE WALL

Being trapped in a small space

means horior for the clens.

trophobic and Super Brenkout

well have them crying out in

driemma is to disjodon the bricks

The only way to get out of the

Super Breakout is one of the intest names for the Ateu Video Computer System following the traditional version. Five different sometimes of play are included in the package, regular Brankont. Double Breakout, Cavity Break out and Prograssive Bieskout All for ene or two players

At the bottom of the sciennis n hat which you control using the Aterra competible paddles When the came kicks off a ball is served into the play mine which von here to bounce off your black to make it rebound somest the coloured bucks at the top of

Fach buck you successfully knock out disappenis from the scienn and you are awarded

Bucks in the list two lows of the repoler came of for one point each. The second and thad lows are worth three goints each and the lifth and sixth ones will not who five has buck and the seventh and nighth rows bricks earn you seven points each

Depending on the game value tion you play and certain stages reached in the play this points are companies doubled to tripled fin Donble Breekout the meximum score is infinite, so you can go on building up a high score indefi

Another teature is a childran's version making the game sesser if you want to let the kids let up. The difference is that the speed of the game is slowed down so you have more time to react and judge the best place to position your but to hit the bell.

The certudge sells los £14.95, from Atrin distributors



# CENTRES TV GAMES CENTRES TV GAMES CENTRES

#### **BOCKS FOR** ALL AGES

#### BEST SELLERS

Asteroids made the transition from ercade to home entertem ment centre for more succees fully than its predacessor. Space Inveders. Atan come no with the excade come and were first to include a cartildge for the video comouter system - which now ontsells Space Inveders and it resulted in an international competition last November to find the too score.

The target is \$42,910 points. which an American player achieved, to win the contest

The extended burtle through the cosmos each hit soliting them in helf, each sized mck being worth a certain number of rock With the difficulty button on a blue flying sauce) whizzes through the storm, firing on your

left or right to fire and moved out ot position by use of the thinst which pippels it in the direction it is pointing

Other features incorporated into different versions of the fight. Make the most of the cloud gams (there are 66) include hyperapace, which transports you instantly out of danger to either short or long range bul

fri other versions you can have the hyperspace sweeped for protective shields which enable you cartridge to pass through asteroids, but these are only effective for a buref second and then blow you no it over used. And finally a 'fire" effect enables your ship to spin 180° and fire at oncoming danger from both sides very

You are given five lives to start off the game but extre ones are everlable every 5, 10, or 20 thousand points, depending on the difficulty you set you self. In later walls the large blue saucer is replaced by a far more deadly small green one who homes in on your ship much quicker. With each cleered screen more rocks are added to the game

Guaranteed to hold your attention, it coats £34 50 from Alan's U.K. distributors



#### **ACTION IN THE AIR-WAYS**

#### RIPLE ACTIO

There's real skill when you take to the sinears in Tuele Action You are in command at one of points. The smallest ones net two planes engaged in bettle 180, downwarde to 10 for a grant aiming to score 15 points before yon) opponent. To score points you must shent down the noon sition or get a direct hit at the balloon which begine its ascent The spacecraft can be intated from a platform in the middle of the screen.

> Cloud formations are dotted in the sky for you to use as cover if you want to hide from you opponent in the heal of a dog cover during battles.

Your armements consist of

Baitle Tanks is another of the gemes on the seme Intellivision The object is to beat an enemy

#### TAKE YOUR CUE FROM THE U.S. friend. Whoever is the best per-

Potting the coloured balls in the pockets of a snooker table is a real test of your judgement of

distance end angles Line up your one in one of two snooker table games just released for the Philips G7000 television games centre Eight Ball and Rotation are versions of two poquies American games translated for a British audience In Eight Bell the idea is to pot the two dark balls which lie in e to ball Inangle. The option is open los you to try and beet the

computer or to challenge e

tank by deatrowne it with your own shalls fin the access are positioned aeveral walls differing in length es wall as clumps of tines. The walls can be used as a protective shield, from enemy fire. But watch out if you let your tank luck behind the trees. because those can be blasted to

Opt to the thed came Car Racing, and you have to sece nominst the clock over e distance of 100 miles. Not only do you have to keep your car on the filled with heavy lonies streight and narrow, but you also have to deduce other traffic on

This Triple Action cartridge is syalable from Intellivisien's distubutous via Advenced Consumer

Electronics (ACE) of north London for the atanderd price of

son to out the two deck balls in

the packets wins Rotation is also played with t0 balls. But this time there ere five blue ones and five yallow, axclud ing the cus ball. The sim is to pocket as many bells as possible If you get bored with that you can design your own variation Why not put a value on the different bells, or try pocketing elternating coloured belle, or how about each player opting to put down e certain colour? The deci-SION IS YOUR

Coming in one cartridge Eight Bell and Rotelion costs £15

#### HELP THESE CHICKS CROSS THE ROAD

Why did the chicken core the

road? goes the old children's inke Il you found the answer unconvincing as a child, then you

well find it totally implausible when you plug the Freeway car tudge into your Atan Video Com priter System Two chickens are in a race to

get to the other side of a 10 inne motorway which is iam packed with traffic Every time you man age to dodge the cars and lorries and successfully cross the 10 lanes you score a point

Thurs are two levels of diffi culty and eight different game varsions, in each one the traffic spends up slightly You can't judge when to leap out into the roads because the cars end lorinea' speeds and randomly gangialed The lower numbered pame venutions are only pleaned by cars rather than loures which makes the traffic easies to inmo-On version eight the freeway is

You use the foyelick to meneanvie von chicken ecines the used, but you can only move him up or down, net sideways

Freeway is one of the letest artiidges out for use on the Atan games centre and is made by the US Inm Activision It will cost you £t8 95.



# REVERSI

#### SCREENING YOUR PROGRAM

There are plenty of practical problems which crop up when putting the game of Reversi on a computer screen.

Leaving the actual programming of the machine to play a good game aside for a moment, in just representing Reversion a screen there are several guidelines which can help in the presentation of the game.

The problem arises when one tries to show a hoard and pieces on a screen, since almost every computer has its own

unique way of doing this.

The method I used was to draw
the fixed information such as the
hoord and its square numbering
using Basic PRINT statements
and then to POKE the pieces into

the correct memory locations to make them appear on the board. This is much quicker than reprinting the whole display

offer each move. My board is pole hlue with durk blue lines dividing the squares. The machine plays with blue pices and play with blue pices and play the beautiful play the play the play that turned out to be easential was to make each newly placed place floah for several seconds. Without this, it was difficult to spot where the computer had moved, particularly the play that the play the

However, it's not impossible to write a Reversi program on a non-graphic monochrome computer, it's just a little slower and

The strategy my program uses is: for every unoccupied square, test to see if a legal move is possible. If it is, evaluate the move and compore it with the best move ound so far. Save the better move.

After testing all the squares, play the best move found. Turn Reverse to the old Legitah news by the board game which has recently became popular as Offinite sizes being re-evanted in Japon As Othelle is the trade some for the game we have decided to rever! in calling our column "Reverse" as their is the name hunger gives to

over all the appropriate pieces then went for the humon player's response. Test that the humon player's propriet in the player's move is legal and display the new board position if it is. Repeat until either hoth players pass on successive moves or move 65 in reached. Add up totals of both players and compounce witner.

I have glossed over the move verluction toutine. A simple program will use two Busc carrays, one I by 10 to represent the state of the board and another that contains the desirability factors easigned to each square. The board state array is 10 × 10 in size simply of the contains the desirability factors of the contains th

the transfer of the control of the c

tion that contains at least one opposing piece then the move is legal, it's shorter in Basic than in English

To evaluate a move the routine adds twice the value of the square played on to the sum of values of the places captured. The values assigned, which should be varied by anyone experimenting with the program, reflect such factors as the desirability of corner and edge squares and the relative undestrability of squares that enables on the control of the proposal to make a corner of a popular to make a corner of the popular to the player to the program of the program of the player to the pla

Towards the end of the game, positions are relatively unimportant and only sheer numbers matter, this is reflected by resetting all the values to 1 for the last few moves.

A more complicated program could try resetting the values to reflect the position of the places, for example: once a corner has been taken, the squares next to the corners could have a higher value assigned to them.

Only legal moves should be fully evaluated but even so the computer will take 15 to 25 seconds to make up its mind. First attempts should not try to make the machine look at its opponent's possible responses, it would just take too long

One compromise I have worked on hut not yet completed is to write the move examination routines in machine code while still using Beast for the rest of the program. This would speed things up enormously.



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Space craft and allen beings were the preserve of the science tiction enthusiast I ong before they began appearing on our computer screens. Sci-II also has a long tradition for being the most innovative tamily in the literary clan. We thought we should fag this source of new ideas and invited author David Langtond of the Science Fiction Foundation to lead us gontly into the diverse concerning the source of the science from authors.

David will sift through the latest ideas and reproduce the best of these and provide some greatly appreciated humour on the way.

appreciated numour on the way. In his tirst column, David looks at one way for beginners to approach giving a game a science liction feel and presants a simple example. Space Blockade.

New computer owners may well be alarmed by the awesome accuracy seemingly needed to prepore a lengthy Basic program.

Ignoring the frowns of the puruts (the ones who hove no time for you unless you can write fluent muchine code while standing on your bead in a thunderstorm). Iet's look at how to cheat—to work up a half-baked idea into a tmy but operational computer game without any wast planning. You might coll it comruter dociding.

My wile, dispunited by pickening at her office, suggested a gome where you bed to steer small unfortunate non-union people though immense and non-sobre sevening, the game of "Flying Pickets" came into being Lef's not deal with such politically sensitive motters but with the dimost indistruguishchile game culled "Space Block to these cowording" of sheer cowording

A borde of evil extraterrestrials hangs over the Earth. Our planet is doomed and must be evocuated. One by one Earth's brave little ships boost into spoce, only to periab miserably by collision with the allens' invulne

unless you steer between them.
Obviously this is dead easy
unless the fiendish baddies keep
on the move. One simpleminded way of doing this on my

# COMPUTER

#### BY DAVID LANGFORD

TRS-80 is to make up a long string by adding up CRR graphics, you PRINT this, and because it is such a long string it insist the prints the top halves of all these invaders and then wrong sound to the next line to print the bottom believe — giving them a crisiter wriginging motion when they move as described below. Repeat to give three spaced-out

send up through that lot is a mere bittle moving blot' steered by the arrow keys, easy to arrange on any machine, using a function like NKEY to read in the steering instructions. You'll know what comes next the sbip starts at horizontal position X and vestical incessured from the top) position Y somewhere near bottom centre of the screen, and



row starting at the left-hand edge of the screen and reaching not all the way across.

Repeat the PRINT again and again for all three, stepping up the TAB function or equivalent to overprint and have these block ade lines shuffle a space to the right each time. When they reach the right-hand edge you can start them moving back again. There rows of monstrous Things sidling to and fro in the

The simplest "Earth ship" to

moves depending on which arrow key was last pressed.

If it was the up-arrow then the new Y must be made on less than the old one; the grophics blot at X,Y is turned off and that at X,Y-1 turned on . . . and so on in a loop until a different arrow

If you go straight up like that, the cbances are that sooner or later you hit one of the Things in the sky, and are blown to smithereens. The program should test the new point X,Y on the display before turning it on

# 

to move the "ship" there: if it's glieddy occupied. then blooie! You can set various levels ol difficulty by letting your ship move twice, live times, 10 times los each move of the blockaders - have an endless loop for the moving invaders, say, and an inner FOR-NEXT loop handling

the movements of the ship. Finally, tidy the come up. Fanlates if you get through the blockade to the top of the screen. A counter giving the player (say) 10 ships. A score display in some handy comer: 4 ships escaped, 3 lost, 3 to Jounch. A trap to prevent people sneaking round the blockaders when they're at far left or right of the screen - il the horizontal pasition X gets too small or too large the program blows you up anyway lor, et . . using too much fuel.

A preliminary display of instructions so those unfomiliar with the goine can sit down and play without a PhD in computer science. "Asual minefields" of fixed graphics dots between which players must thread their way . . . More sadistic programmers can make the level of difficulty rise a lo Space Invaders as the gome goes on, until by the end the blockaders move faster thon your ship and only a mira-

cle can get you through. But you can think ol your own Itills The point of Space Blockade is that it's reosonoble fun and can be put together in a lew hours only. by a process of computer doodling you produce that line of hulking figures, then three lines, then three moving lines, then add the escaping ships and as many as you like of the frills above . . . Take it slowly. And if you were nervous about programming your own games, you should be a lot less so when you've inished.

Here's one way of cobbling together Space Blockade on a TRS-80 (Level II). Almost certamly it's not the best way. The lowest level of dilficulty is very easy, the highest too hard though there's a deliberate bug included to ensure the author can olwovs win and amaze his friends by sneaky use of the space bar

Don't just copy or adapt this version il vou'ie new to computing: it's much more interesting to tockle the programming yourself, glong the lines suggested The general approach should work on any machine with a memory-mapped display.

10 CLEARSTO DEFINTA-Z'' (C) DAVID LANGFORD 1981
20 CLS PRINTG406, "SPACE BLOCKADE", FORT=1T02000 NEXT-PRINTG640, "USE APROLLEYS T 30 IFN:9THENN=1ELSEIFN:0THENN=10ELSEN=10-H

48 INPUTION YOU WANT IN RISK THE DREADED BERIAL MINEFIELDS" EX

50 P\$=CHR\$(156)+CHR\$(191;+CHP\$(172)

88 T\$=T\$+CHR\$(202) FORI=1T08 T\$=T\$+0\$+"

190 P##STRING#(15,140)-FORI#0T0768STEP256 PRINT@I,P\$, PRINT@I+49,P\$ IFLEFT# B#

1)X>"Y"THEN110ELSE0=4~0:PRINT@I+15,STRING\$(34,132+0), 110 NEXT 120 DP=1:P=0 X=64 Y=44 R=32:DX=0:DY=0:SC=0:ST=10 K=0 PRINT0977 P\$ P\$:

270 DX=1 DY≈0 G0T0300

\*\*\* FOR HITOSO NEXT PRINTERSS CHR\$(207): NEXT

410 RESET(XX.YY) RESET(X,Y) SC=SC+1 ST=ST-1 PRINT9892,SC"HOW IN DRBIT", PRINT989 6,10-(ST+SC)"SMITHEREENED"; PRINT9960,ST"HOT LAUNCHED ".P\$;Pf, IFST=8THENE08

428 X=44+RND(40) Y=44 SET(Y,Y) R=32 DX=8:DY=8 R\$=INKEY\$ GOT0280 500 PRINTEBS6, CHR\$(207); PRINTES60 CHR\$(203), FORI=1TO50 PRINTEBS2, "\*\*\* FAILED \*

\*\*\* FOR J=11020 NEXT PRINTERS2, CHR# 207) NEXT SC=SC-1 GOT0410
600 PRINTERS3 "PRESS SPACE BAR", PRINTEI009, "TO PETHRT.", 0.3=1N\*E:#
610 PRINTERS1."\*# GAME OVER \*\*", FOR]=11040 NEXT PRINTERS1,(HR#(207)) FOR[=11040 NEXT: IFINKEY#=" "THEN20ELSE610





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that its only word to really describe sucrecumputes system the home suppositive with the TES 40 and ideal for the superb Cains computer which is all mores hobbyest

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A MACHINE LANGUAGE MONTOS with Display modify date and stancion with beaux polaris fractions when the machine fractions beaut I have all of the plant the built to except detail. Let EAM the EOM with EASC temperate old one to be bound on a statement with one of class and operated perspire all and the party 2007s of per-seasons of programmes vanished for all and one of the east of the companion of the programmes and perspired and the east of the companion of the east of the ea

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supdeted Expansion Box (BC 3014) is a local feature of this saw Genius I system, durin subseasities possibilities allowed rap to 4 dusk drawns with opposed albit dessettly 2 consects proposed albit dessettly 2 consects pro a printer of 25% interface or 5000 sands These is 30 UM Otted and it have new low prints.

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# arcarde

# MISSION (ALMOST)

Scremble was the first mode machine to send you on a mission and quickly pared a big following:

Aimed with a spaceship which fires bullets and drops bombs, the player is given differing stratches of terrent to cross and a veriety of things to blow up.

The societ of the game is screen position. Where you are on the access dictates how much manoauvisability the craft has and how wall it can avoid obstacles and hizzeds.

The acrean background is rolling constantly forwerds and your spead is rapilated by a joystick-type level which moves you up and down and backwords and lorwerds. Pushing the lavel back anables your craft to "hover" against the background, until you come to the background.

The first screen gives a mountainous background with ground to an installations and fuel dumps. Fuel is the crucial consideration in Scramble, as without it, you will plummet hom the sky Extra fuel is obtained by



blowing up fael damps and on this first oasy scriming the player should take his time and bomb as many damps as pessible.

many dumpe as possible.

Momoriang screan positions is a vital part of achieving a good score as in lihe same situations, missiles fire at the same time.

The installations in the fourth will can only be bombed jnot shotland the sciencidess up to leave a very reliev, vulnerable space at the top of the scient.

on But it is the fifth wall, the year maze, which couses the most its problems, as it involves long vertical stratches which can only be no supported by careful use of the bod joystick, moving as its forward as ne, possible and then dufting back with the screen.

The ling for the first sense of a science auccessfully completed or can be enried by either shooting or crashing leto the robot figure by the skyczence after the mare

# THE SUPER GALAXIANS

GALAG

The Gallinga race has arrived on the British accode acons in our bacambar issue we warned of the coming stresson of a new improved Galleson and now we can fill an a few more datais of this new look.

Like Salaxian the creatures fly in formation above the firing specaship under your command, and swoop down to attack, firing bullets or they come

Unlike their predecessors the creatures first fly into formation from the indiges of the acreen, giving the player an extre apportunity to shoot them. They also swoop back up to join their com-

swoop back up to join their conlades after an unsuccessful dive — disconcertingly apprairing under your creft

The Galagae themselves are the leaders of the continues and must be hit twice to successfully kill them off. When they reach the bottom of the scient, they continue your specific bottom of the scient flyour hive no is set of the scient flyour hive no is set we pass specific the fifth the game is own, if you do, then the challenge is to shoot the Galagae without hitting you.

own ship and so rescue it.

If you manage this, the second craft teams up with the first to fise in tenders, making a much map a lifeur at defence force.

The first and second stage are the same but then you entor the hist challenge stage with the 40 craft shying, without fixing, across the screen — but them all for a 10,000 bonus — winy useful when you consider that 20,000 brings a new specialist.

The second challenge stage really needs a tendem ship to achieve this and the third challenge stage makes the creatures faster still.

In later screens the droid whips flash red and spirt into three "scorpion" craft which swarve all over the screen

Another leature of the game is that it is possible to develop a technique for almost continuous fire by flicking the fire button hard and fast Plenty of scope for the good pieger and a succession of new challenges.

#### KNOW YOUR CREATURES

How many sicular creatures did you get right? We put a Taido apace invaders table up far gaba for the passon who could correctly name the machines which these nine areads inhabitants come from

- (A) Pheonix
- (C) Moon Cresta
- (B) Delander (E) Gelexion
- (F) Space Invade:
  - (G) Space Fury (H) Wizard of Was
  - (I) Mazaman, Puckman as Pac-

The name of the winner will be announced in our March



# 

### **CONFESSIONS OF AN** ARCADE RODENT

Puckman with a Tom and Jerry MOUSETRAP 11 BD

nered mouse is to set a bone

In this maza-chasa game, the player takes on the role of the mouse and the villains are the cats

the mere esting ources of cheese with the cats chasing after him. There are dones which all rodent hero can close behind him

to fand off the enemy The other recourse of the cou



Do notif here it all seams vary reminiscent of the Puckmen game but there are a few extra leatures which add to the oroblems of heing an arcade mouse

Bads By around the screen and will not the mouse if they come across him. The mouse can ascage the bads by hiding in the coiners of the scresn

It is an all-action affair which builds locally on the specess of Puckmen but requires the player to think further shead After finding that frogs make

very accuntable scient beings the arcade industry is following this Theory to its logical conclu-

The cartoon heroes seem ideal participants of this new excede game which features, cheese, mice, cats and dogs - in short all the ingredients of a successful cartoon advantore



#### Take your cue from the U.S. The American pool table ousted This technique has gliendy

the native but billiaids from nomerous public bars, many venta ago

But with the necessity of find ing cus space all sinned the bulky tables, meny pubs found

that they could not afford the spece to incorporate a pool table But the video demas industry came up with an alactionic solution by fitting pool into alcade

pames cabinet. Video Pool is already proving a popular addition to the arcade scene instead of using a cue. pleyers have to perfect the skill of lining up a cross on the cue

been used in computer versions of spooks: It needs a good eve to line ap-

the cross so the cue bell is hilled For those who have not tred

their heads at the game Americans swam is batter than snooker the em is to nocket your own bells while heaving your opponents' on the table

The 15 balls min divided into two groups of seven, spots and stripus, and the black "ii" bull which must be left to last

The winner is the first player to pocket his own seven bells and then down the black

### LOSS OVER THESE GHOSTS

CRASH ROLLER an arcada game based on them

Following the craze for more down to-Earth Thomas on the sicade scene, comss Crash Roll let, which could as wall be

named, "Crazy decorator The geme is similar to the Puckmen/Mazeman type chase game with ghost-like creatures chasing our intropid DJY enthusiast through a series of

interlocking (gadways But while in the Mazeman game. The idea is to not the spots, here the plever must pain! over the condways

It is more difficult then its predecessor elthough there are poly two phosts in this version They are faster then then Puck

guicker than the painter To combat this, the painter can

run to one of two bridges which are incorporated on the roadway There he can grab a hope paint roller and thin the lablas on his onisuers in MR affort to paint over them. Bonus scores are collected for much ghost who is caught beneath the paint roller

The garle is further compli cated by the random appearences of creatures who will mass up the decorator's handwork A cal, bild or motor car will appear - in much the same way as fruit does on Puckmen - but These do

not rust offer bonnses The cut. for exemple leaves footounts in the printwork and must be printed (let and his footpnnts painted over II is vary easy to find yourself cursing these interruptions as a real decorator woold any faline crimi-

Requires and offered for clear ing scieens in a good time and e new screen appears to be filled in enother bright colour. The first scieen for instance in a forid green. An aptional feature is provided in black holes that appear sendomly in the condway and the decorator can disappear down

The budges are an interesting lesture, in that you can run over and under them





RUMS ON AN APPLE

Two World War I gir aces ore locked in an oerial duel in the skies above France

Discover the skills needed to loop-the-loop and come book on your opponent's tail. This is one ol those two player shoot-emdown games in which the screen is the sky and the paddles your controls.

Each of two players has an geroplane, presented on the Hi-Res Apple screen which con he directed with the paddle knob. The button allows you to

5 REM DOSFIBHI - MARK PELCZARSK 1. 1980

10 90909 4000 20 POKE 232.01 PSKE 233.3 22 BA = 01PC(1) = 3

23 PE(2) = 6

24 HOME

27 9 = 2 78 R2 = 3

152 INPUT "YOUR NAME? "1AS 154 IMPUT "OPPONENT'S NAME? "+84

160 INPUI "SPEED (1-10) ?" | K

170 R = 3:59 = 0

ISO SCALES S 190 HGR

195 HEDLOR: BAI HPLDT 0.01 CALL 67454

200 HOME | VTAB 21: PRINT A4, " \*199

300 X(1) = 20sY(1) = 120 310 F421 # 160 F421 # 120 320 D(1) \* 16:D(2) \* 16

400 FGR 1 = 1 ID 2> ROT = D(1) & 41 HCGLOR= PC(I) 405 H(1) = 0;H(1) = 16

410 DHAN 1 AT X(1), Y(1): HEXT 1 420 VIAB 231 PRINT \*PRESS ANY KE Y TO START'S SET CO

500 FDR 1 = 1 TD 2 505 3 = 3 - 1

510 BUSHB 1000

520 NEXT 1

530 1F 9N = 1 DR HI11 = 5 GR HI2 1 = 5 THEN 4000 540 BOTO 500

1000 HCOLOR= BAI RGT= D(1) 4 4 1010 BRAN 1 AT X(I),Y(I) 1070 C = PDL (1 - 1)

1030 IF E < 20 THEN D(1) = D(1) -L: 80TO 1040

1040 IF C > 235 THEN D(1) = D(1)

1105 A = 218 = 11 SQTD 1120 1104 A = 1:8 = 1: SOTO 1120

1107 A = 118 = 21 BOTD 1120 1108 A = 0:8 = 2: SOTO 1120 1109 A = - 1:B = 2: BOTO 1120

1110 A = - 1:8 = 1: SGTD 1120 1111 A = - 2:0 = 1: ADTO 1120

1112 A = - 2:8 = 0: GOTO 1120 1183 A = - 218 = - 11 8010 1120

1060 1F 0(1) = 0 THEH 0(1) = 16+ SDTD 1090

1070 1F D(1) = 17 1HEM De1) = 1 1080 ON D(1) 9070 1101,1102,1103 .1104.1105.1106.1107.1108.11 09.1110.1111.1112.1113.1114. 1115,1116

1101 A = 1:8 = - 2: BOTD | 120 1102 A = 1:8 = - 1: 80TO 1120 1103 A = 218 = - II 9070 1120 1104 A = 2:8 = 0: 80TB 1120

1114 A = - 1:8 = - 1: GOTD 1120 1115 A = - 1sB = - 2s GOTO 1120 1116 A = 0:8 = - 2 1120 I(I) = I(I) + K & A

1130 IF \$(1) > 278 THEN \$(1) = 1 (11 - 278

1140 IF X(1) ( 1 THEN X(1) = X(1 1 + 278

1150 Y(1) = Y(1) + K & B 1700 DRAW 1 A1 X(1), Y(1)

1250 JF ABS (X(3) - X(3)) ( R2 AND ABB (Y(1) - Y(3)) ( R2 THEN 2500

28 COMPUTER & VIDEO GAMES

fire at your opponent but you only have 16 missiles so take care not to waste any.

You must hit your opponent live times to win the game. To prevent you crashing into the side of the screen and to help conjour sneoky ambushes, when you go oil one side, you reappear on the other in a wrap-around

The game can be played at 10 dilferent speeds but five and six ore recommended as the best lor beginners.

Be careful not to collide with one another as the computer will, register that as a crash.



- 1300 IF PEEK (1 14299) ( 129 THEM RETURN
- 1305 IF M(I) = 0 THEH RETURN
- 1308 H(1) = H(1) 1
- 1309 VTAB 23: PRINT M(1): MITS "1H(1)1" HISSLES "(H(2)1" H
- 1345 HCOLDR= BAI DRAM 3 AT IM, YH 1350 HEIT L
- 1400 IF H(1) = 0 AMD H(2) = 0 THEH PRINT "YOU'RE BOTH OUT OF M
  - 1950 FR. "198 # 1

- 1160 IF Y(1) > 158 THEN Y(1) = Y (1) - 150
- 1170 IF Y(1) ( 1 THEM Y(1) = Y(1
- ) + 158
- 1190 HCGLOR= PC(1); ROT= B(1) #
- ITS ":M(2): MISSLES " 1310 IN = 1(1) + A:YM = Y(1) + B
- 1315 FOR L = 1 TO 40 1320 KM = XM + AsYM = YM + B
- 1325 IF IN > 278 OR IN ( 1 DR YH ) 158 OR YH ( 1 THEM 1400
- 1330 HCOLOR= 5: ORAN 3 AT IM.YM
  - 1340 IF ABS (XM X(J)) < R AND ASS (YM - Y(J)) ( R THEM 20

- 1410 RETURN
- 2000 H(1) = H(1) + 3
- 2010 809UB 3000 2100 VTAB 23: PRINT H(1): HITS
- "1M(1)1" W198LES "3H(2)1" H 1TS "1M(2)1" MISSLES "
- 2200 IF H(1) ( 5 THEM 1400 2210 RETURN
- 2500 GDSUB 3000
- 2510 PRINT "YOU DUMMIER CRASMED
- LINTO EACH OTHER!!! 2515 8% = 1
- 2520 RETURN 3000 FOR H = 1 TD 2
- 3005 FOR L = 1 TO 5
- 3010 HEDLOR= LI SCALE= LI DRAW 2
- AT X(3), Y(2)

- 3020 MEXT L TOTO MEDIAN AND
- 3040 FOR L = 1 TO 5 3050 SCALE= L: DRAM 2 AT 1(3).Y(
- 3)
- 3040 HFXT L
- 3042 HEXT H 3045 SCALE: S
- 3070 RETURN
- 4000 IF SW = 1 THEM PRINT "NO H
  - 1MMER. .. "11 GOTO 4100 4010 IF H(1) = 5 THEN PRINT A41
  - \* 15 A WIMMER \*\* 12 SOTO 4100
  - 4020 PRINT BOL" IS A MINNER "D 4100 1MPU7 \* TRY ASAIM?" 1C
  - 4110 1F LEFTS (CS,1) = "Y" THEN
  - 4120 IF LEFTS (CS,1) ( > "M" THEN
  - 4100
  - 4125 TEXT #130 STRE
  - 6000 FOR L = 768 TO \$19
- 6010 READ No POKE L.M. 4020 MEXT
- 4025 HETURN
  - 6030 DATA 3,0,8,0,21,0,48,0,36,
  - 18,55,55,9,9,60,60,54,62,9,7
  - 6040 DATA 18,62,60,39,45,36,55, 63,44,44,37,39,45,46,46,44,5 4,39,55,46,46,52,62,62,36,55
    - .0,63,33,36,0



#### RUNS ON A NASCOM II

The ancient game of Nim is brought in given a 20th Century feel by the addition of robots in place of matches.

The robots are shot by the players and removed from the acreen as the matchsticks are, in the game of Nim.

Based on the Android Nim game which is popular on the Tandy machine in America, Nimbot should find a receptive

audience in the U.K. Nimbot sets out the robots in the usual seven, five, three, formation, and challenges you to shoot 1-3 from any column. If more than one is taken, then those removed must be adjacent.

either vertically or horizontally. The object of the game is to shoot the last robat, but the for people who can think ahead, makes sure it is not as simple as it appears

Nim has already proved an ideal candidate for computerisation. Nimbot makes it visually

exciting as well. The program will let you choose to go first or second and plays a tight game of Nim.

Remember to give plenty of thought to your opening moves. because these can be just as crucial as those played when the last few robots are nervously wanting to see which of their number will be shot next.

But don't feel too guilty if you shoot the last one, the Nascom will soon build up another three columns for you to tackle.

ROBOTIC NIM No. DEMO

CONNECT SPEAKER TO BIT O PORT

#### BY TERRY BROWN

#### AND KARL PARKER

TO GET AN AUDIBLE DUTPUT FROM GAME

100 CLS: WIRTH 255: BBKE 4100: 3200: CLJ AR 1000

140 FOR A=3200 TO 3249: READ B: POKE A: B: NEXT







- 170 DATA 86,43,67,62,2,255,16,251 180 DATA 219,4,47,211,4,21,32,242 190 DATA 173, 16, 230, 35, 35, 24, 24, 193 200 BATA 201, 193, 16, 230, 35, 35, 24, 224
- 210 BATA 193, 201 220 FOR A=3264 TO 3274: READ B: POKE A: B: NEXT
- 240 Os="JJJJJ":Ss=" 250 DATA " hhATN "
- 260 DATA " 33TAN
- 2/U DATA "MIDSJJMIDSPOINT"
- 280 DATA 'TANJPOINTTAN' 290 DATA "rJ-D/V
- 300 BATA " hhATN "
- SID DALA " STAN "
- 320 DATA " JJATN " TETAN "
- 340 DATA " hMJPDINT
- 950 DATA " GSIN "
- 360 DATA " IPIPAIN "
- 970 DATA " fTAN "
- " ATAD 08E
- 390 DATA " 99TAN "
- 400 BATA " hhATN"
- 410 DATA " 33TAN"
- 430 FOR A=0 TO 4: READ A\$(A): NEXT
- 440 FOR A=0 TO 5: FOR B=0 TO 1: READ H\$ (A.B)
- 450 NEXT B.A
- 460 FOR A=0 TO 3
- 470 READ A1(A, 0), A1(A, 1), A2(A, 0), A2(A, 1)
- 480 NEXT
- 490 DATA 8,7,9,6,8,8,10,6,8,9,11,6,8,10,12,6 500 LOKE USER-KEY
- 520 PRINT "Do you want instructions ?(Y or N)" 530 A=USR(0): IF A=0 THEN 530
- 540 IF A=ASE("Y") THEN GOSUB 1870: GOTO 560 550 IF A()ASC("N") THEN 530
- 560 N(1)=7:N(2)=5:N(3)=3
- 570 CLS: A\$=" NIMBOT Coryrisht (C) South East
- 580 A\$=A\$+"London Software": A=0 590 A=A+1: POKE 3017+A+ASC(MID\$(A\$+A+1))
- 600 IF A(48 THEN 590







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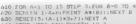
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640 DOKE USER, KEY: SCREEN 10,7

650 PRINT "Do you want first shot ?(Y or N)" 660 A=USR(0): IF A=0 THEN 660

670 IF A=ASC("N") THEN GOSUB 1820: GOTO 870 680 IF A()ASC("Y") THEN 660

490 GOSUB 1820

710 A=USR(0): IF A=0 THEN COSUB 1000: GOTO 710

720 R=A-49 JF R(O DR R)2 THEN 710

730 POKE VOU+5+R\*320+64, A 740 A=USR(0): IF A=0 THEN GDSUB 1000: GDTD 740

750 IF A=8 THEN POKE VDU+5+R\*320+64,32:GOTO 710 760 N=A-48: IF N(1 DR N)7 THEN 740

770 POKE VOU+5+R\*320+192+A 780 A=USR(0): IF A=0 THEN GOSUB 1000: GOTO 780

790 IF A=8 THEN POKE VDU+R\*320+197, 32; GDTD 740

800 IF A()13 THEN 780

810 GOSUB 1300: REM \*\*\* LOOK AT LINE 820 POK: VDI4R\*320+69, 32: PDKE VDU+R\*320+197, 32

830 IF F=0 THEN 710

840 GDSDB 1440: REM \*\*\* TAKE SHOTS

850 IF N(1)+N(2)+N(3)=0 THEN 1210 860 PDKE 3018,32

870 A=N(1): A=FNX(N(2)): A=FNX(N(3))

880 1F A)0 THEN 900

890 FOR C=1 TO 200: GUSUB 1000: NEXT: GUTO 1130 900 S=0:FOR H=1 TO 3:FOR D=1 TO N(B)

910 X=N(1):Y=N(2):Z=N(3)

920 IF B=1 THEN X=X-D 930 IF 8=2 THEN Y=Y-D

940 IF 8=3 THEN Z=Z-D

950 A=X: A=FNX(Y): A=FNX(Z) 960 IF A=0 THEN S=S+1:S(S,0)=8:S(S,1)=D

970 NEXT D.B

980 S=INT(RND(1)\*S+1):R=S(S,0)~1:N=S(S,1)

990 FOR C=1 TO 200; GOSUB 1000; NEXT; GOTO 1160 1000 V=V+1 AND 7: IF V THEN RETURN

1010 Y=INT(RNB(1)\*3+1):X=INT([-NB(1)\*N(Y)+1)

1020 IF N(Y) - > THEN 1000 1030 H: INT(RNII(1) #5+1)

1040 FOR A=U TO 1:SCREEN 52-5\*X-5\*Y:5\*Y+A-4

1050 PRINT H\$(H, A); :NEXT

1060 IF H(5 THEN DOKE USE - KEY: RETURN 1070 L=INT(RND(1)\*8+1):POKE 3220:3

1080 DOKE USER+SDUND: BF=13\*256: FOR B=1 TD L

1090 POKE BF, RND(1) \*20+20: FUKE 8F+1,2













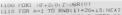












1120 NEXT: H=0: PDKE 3220, 2: GDTD 1040 1130 X=0: FOR A=1 TO 3: IF N(A) X THEN X=A

1140 IF N(A)-X AND RND(1)).5 THEN X=A

1150 NEXT: R=X-1: N=1 1160 GDSUB 1300; GDSUR 1440

1170 IF N(1)+N(2)+N(3) THEN 700 1180 SCREEN 15,7, PRINT "I'VE BEATEN YOU!!!!"

1190 FOR A=1 TO 8: Z=105R(0): NEXT

1210 SCREEN 15,7; PRINT "YOU'VE BEATEN MELLID"

1220 FOR A=1 TO 256: DUT 4, A AND 1: NEXT

1230 DOKE USER, REY 1240 A=USk(o); IF A=ASC("Y") THEN GOTO

1250 SCREEN 15,9: PRINT "Another same ?(Y or N)

1260 DOKE USER, KEY 1270 A=USR(0): IF A=ASC("Y") THEN 560

1780 IF A()ASC("N") THEN 1270

1290 GUTO 2070 1300 H=0: GUSUR 1410: FOR A=1 TO 300: NEXT 1310 H=0: GDSUB 1410: FOR A=1 TO 300: NEXT

1320 IF N(R+1)(N THEN 1370 1330 RESTURE 1360

1340 FOR B=1 TO 8; READ H: GOSUB 1410; NEXT

1350 F=1: RETURN 1360 DATA 4,0,3,0,4,0,3,0

1370 RESTORE 1400 1380 FOR B=1 TO 8: READ H: GOSUB 1410: NEXT

1400 DATA 1,0,2,0,1,0,2,0 1410 FOR A=0 TO 1: SCRIEN 1, R\*5+A+1

1420 PRINT HS(H,A); NEXT A 1430 FOR A=1 TO 75: NEXT: RETURN

1440 H=2: GOSUB 1410: FOR A=1 TO 1000: NEXT 1450 FOR A=0 TO 3: X1=A1(A,0): Y1=A1(A,1)+R\*15 1460 X2=A2(A,0): Y2=A2(A,1)+R\*15

1470 SET(X2, Y2): RESET(X1, Y1) 1480 NEXT; SP=VDU+7+320\*R+128; PDKE GP+ASC("=")

1490 FOR A=1 TO 1000: NEXT 1500 FOR Y=3 TO 1 STEP -1:1F N(Y)>0 THEN 1520 1510 NEXT Y: GUTO 1580 1520 FOR X=1 TO N(Y)

1530 FOR A=0 TD 1:SCREEN 52-5\*X-5\*Y-5\*Y-5+A+1 1540 IF Y)R+1 THEN H=3 1550 IF Y=R+1 THEN H=1

1560 IF Y(R+1 THEN H=4 1570 PRINT H\$(H,A); NEXT A, X, Y

1590 POKE BF+2,0:FDR A=32 TO 4 STEP -1



# SINCIAIN THE RELEASES \*

#### DICTATOR

Another greet edventure game from Bugbyte for the 16K ZX81. This time, you are the President of a small state. The object of the game is to avoid revolution, escape from essasaination ettempts, and meintain your popularity, while menaging the secret police and army, and meintaining a secure aconomy. This is a vary complex simulation. utilising the whole 16K, and the cassette comes with an sight page booklet giving full instructions and hints on how to survive. Can you stend up to the pressures of life as a dictator and prevent unrest from spreading? Place an order today and find out

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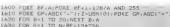












1630 FOR S=1 TO N: BF=13\*256 1640 POKE BE+1,50: POKE BE, 2: POKE BE+2,0

1650 FOR A=1 TO 40: IF PEEK(GP+A)) 32 THEN 1670 1660 POKE GP+A:ASC("-"): 7:USR(0): NEXT: STOP 1670 FOR R=0 TO 4: X=47-5\*N(R+1)-5xR: Y=R\*5+R+1

1680 SCREEN X. Y. PRINT DS:: NEXT B 1690 RF=13\*256:FOR C=20 TO 1 STEP -1: 1700 POKE BE+C: POKE BE+1.50/C: BE=BE+2: NEXT

1710 DOKE BF, O: Z=USR(O) 1720 FOR B=0 TO 4: X=47-5\*N(R+1)-5\*R:Y=R\*5+B+1

1730 SCREEN X.Y.PRINT SA: NEXT B 1740 FOR BEL TO APPOKE GPARASSINEXTS

1750 N(R+1)=N(R+1)-1:NEXT S: POKE GP: 32 1760 FOR A=1 TO 1000: NEXT

1770 FOR A=3 TO 0 STEP -1:X1=A1(A,0) 1780 Y1=A1(A+1)+R\*15:X2=A2(A+0):Y2=A2(A+1)+R\*15

1790 RESET(X2, Y2): SET(X1, Y1): NEXT 1800 H=0:GOTO 1410 1810 COTO 1810

1820 SCREEN 10+7 1830 PRINT "

1840 FOR Y=3 TO 1 STEP -1: FOR X=1 TO N(Y)

1850 FOR A=0 TO 4: SCRFEN 52-5\*X-5\*Y, 5\*Y-5+A+1 1860 PRINT AS(A)::NEXT A.X.Y:RETURN 1870 CLS: PRINT "This is like the 7,5,3 match";

1880 PRINT "sticks game," 1890 PRINT "It consists of 3 rows of robots," 1900 PRINT "The object is to shoot the last "!

1910 PRINT "robot." 1920 PRINT "You chapse how many to shoot from"; 1930 PRINT "any row by"

1940 PRINT "typing the row number (1,2 or 3)" 1950 PRINT "then how many to shoot from that "! 1960 FRINT "raw," 1970 PRINT

1980 PRINT "There is a test tone on bit 0, "; 1990 PRINT "Part 4 " 2000 PRINT

2010 SCREEN 1,10

2020 PRINT " Press space to continue 2030 A=USR(0): IF A=32 THEN RETURN 2040 B=B+1 AND 63: IF B AND 32 THEN 2060

2050 DUT 4,1-INP(4):GDTD 2010 2060 SCREEN 1,10: PRINT CHR\$(27); GOTO 2030 2070 CLS: END

OK





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running and dodging from the many tribes of aliens who make an honest crust by guesting in computer games, Alien Hunt will appeal to you.

In the game you are the dominant life-form and the poor alien is on the run.

alien is on the run.

It makes a nice change for the
humans to be able to win so

make the most of it.

The aim of this Acam Atom game is to trap the alien in the tan left hand corner of the screen.

game is to trap the alien in the top lelt hand corner of the screen by cutting his escape routes oil by drawing lines around him. If you miss your objective and mistakenly trap him elsewhere,

aim ie to get as low a score as possible.
Your ellorts are scored, com-

mented upon and a new game is automatically restarted.

The alien emits a squeat

through the Atom spe trapped or crushed

Due to the printer used not having a hash (\*) symbol, a "f" sign has been substituted. This should be turned into a hash sign wherever it crops up.

No graphic modes are used and the game is written, mainly in machine code, so it only takes up 4.3K on the computer.

Line 17 will be of interest to Atom users as it is a routine which waits for the frame synap pulse to go low, before POKE ing to the screen, thus avoiding the usual Atom screen poise.





1905.c 1801M FF0, FK9, MM9, PP0, ZZ15, SS5 11P., 912, M=24, MM8=-1; PP8=-1.KK8=-1; T=£8082 12F.N=1T0 2;01M P-1, P., #21

167
7 FFB LDMR128 BITERBR2.5NE FFB LDMR12.0TS
28 NGG LDMR15 STRERBR2.5NE FFB LDMR12.0TS
28 NGG LDMR15 STRERBR2.1DMR16801.CMPMLTE.6NE VY1
22 NAMED LDMR15 SED 222.1DMR27 STRERB LDMR15 STRERB
24L0Y89.LDWR128.STRERS.LSP NM9.LDW89.LDMR16803, VCMP824.BEG ZZ2
60.LDMR15.STRERS.JDMR18.STRERS.LDMR127.STRERS.LSP NM9.LDW89.LDMR16803, VCMP824.BEG ZZ2
60.LDMR15.STRERS.JDMR18.STRERS.LDMR127.STRERS2.SSP FM9.LDW89.LDMR16803.DMR127.STRERS2.SSP FM9.LDW89.LDMR15.STRERS2.SSP FM9.LDW89.LDMR15.STRERS2.SSP FM9.LDW89.LDMR15.STRERS2.SSP FM9.LDW89.LDMR15.STRERS2.SSP FM9.LDW89.LDMR15.STRERS2.SSP FM9.LDW89.LDMR15.STRERS2.SSP FM9.LDW89.LDMR15.STRERS2.SSP FM9.LDW89.STRERS2.SSP FM9.LDW89.LDMR15.STRERS2.SSP FM9.LDW89.LDMR15.STRERS2.SSP FM9.LDW89.LDMR15.STRERS2.SSP FM9.LDW89.LDMR15.STRERS2.SSP FM9.LDW89.LDMR15.STRERS2.SSP FM9.LDW89.

28LDXERA, INX/STXERA, RTS 38:222 JMP KK8

78 KKI LDREAS-STREB000, LDRE8001, CMP017E, BNE KV2

/PLUMPHH-LIMPLES-BES ZZZ - YLLDRESS, STXESS, JSS MM9 74LDRESS, STRESSI, LDRESS, STRESS, LDRESS, STXESS, JSS MM9 75LDRESL, STRESS, JSS FFS, STRY ESS, LDRESSI, STRESS / LDRESS, STRESS 78LDRESL STRESS\_JSS FFS, STRY ESS, LDRESSI, JNN, STXERR RTS 88 ZZZ JMP KKS

128 MC2 LDR42, STRESRED, LDRESRED, LOPRESE, BKE MC3 122LDRERA, CHPEB, BCD 225, LDRESP, STREST, LDRESP, STRESS, LDX6220 124LDY86, STXESS, JSR FPS, LDR4 2887, Y, CMP224, SCD 225 125LDR61, STRESP, LDRESP, STRESP, LDR6127, STRES2, JSR FF8 127STRY 695, Y, LDXSRR, DCS, STXESR, KTP.

Runs on an Acorn Atom in 4.5K

By John Kirk



228 KK4 LDR@6/STRE8000,LDRE8001,CMP@EFE/SHE KK5

222LDRESS.CMP81;BES ZZ18,LDREST;STRESS;LDRESS,STRESS;LDX81 224STXE85, USR MM2, LDYR8, LDR( £80), Y, CYP824, 8E0 ZZ18 226LDAE81 STREST LDAE88 STRE86 LDAB127 STRE82: ISP FFR 228LDV88, STR/£85), Y, LDX£98, DEX, STX£98, RTS

238 ZZ18 JMP KY8 278 YYS LDR96, STRESGRO, LDRESSSI, CMPSETE, SNE KY6 272LDAE9A, CMP01 -BEQ ZZ12; LDAE87, STRE81, LDAE86, STRE8A - LDX01

2749TXE85, JSR MM8, LDY20, LDR(£88), Y, CMP924, BEG ZZ12, LDR£81 276LDRESS, STRESS, LDRS64, STRES2, JSR FFE, STRESS, Y, LDKESS

388 ZZ12 JMP KK8

328 KK6 LDRNG, STREBBOO.LDREBBOI.CMPREFD, SHE KK7

322LDAE90, CMPR30.BEQ ZZ13, LDRE87, STRE81, LDRE86, STRE88.LDX81 3243TXE85, JSR PP8/LDR E88), Y.CMP824, SED ZZ13 LDAE81, STRE87 3293 DRESS STRESS LDREIZY STRESS USE FEB. STRESS ), Y 348 ZZ13 JMP KY8

378 KK7 LDAGG/STREBBOS,LDRESGG1,CMPRE7D, SNE KK8 372LDRE98, CMP@38, BEQ YK8, LDRE87, STRE81, LDRE96, STRE88 373LDY80, LDX91

374STXESS. JSR PPB, LDR/£881. Y, CMP224, RES KKS. LDRE81 STAE87 376LDRESS, STREB6, LDRE64 STRESS, ISP FFG, STRESS), Y

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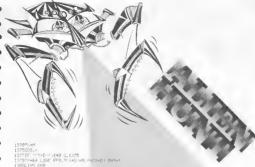
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20007P."\*HE GLIEN (1811 2001-0

20010F.N=170093 WAIT, M.N G. 1328 321920, "L.H. CORNER OF THE SCREEN"

32103P, "USING THE FOLLOWING KEYS " .. . 32105P. USING THE FOLLOWING FOR LEFT-\*\*
32105P. "RETURN .... IS FOR RIGHT-\*\*
22106P. "UP-DOWN RPROW. IS FOR DOWN\*\*

32187F, "AND L/9 REPON....IS FOR UP" ">F. =1735.60S.B.N. J 22189F. "EUSE ""CHIFTED ""KEYS TO ERRSEM"" F. N=1T018 COS.B. N. A 32109P. "Press shift to continue"

3211000 WRIT, U. 768001 OFFF 32111F.N=6800070591FF, 7N=32, N N P.

32120v?EE1=P IF SC=100 P." EXCELLENT\* G. 32130 32121 IF \$<=175 P."VERY G000" G.32138 32122IF 8<=210 P."6000" G.32138

321251F S<=400P."SPD" G.32130



# 1803 BG

### RUNS ON A TANDY TRS-80 IN 16K

### BY MAX CHAUVET

10000 \* SAARO PKIT RACINS 10010 \* 1980. R. CHAMPET 10020 CLEARSON-BEFTRIN \* TICLS 10025 RPSO: BRODE SECURE CONTROL CAD: ACHO: INFO; 7-A: THOUSE FILE 10025 RPSO: BRODE SECURE CONTROL CAD: ACHO: INFO; 7-A: THOUSE FILE

1UH=1: ML=120

10026 SR=0:LP=0:D0=10:SD=600:T[=0:T2=0 10040 M=STR1MG#(255,01:R0#:51M1H6#(75,01 10050 A02M=VANP1R(M00):LPMEK(1659a)=201

10050 ADDR-VARPIR(804):1FPEK(16396)=201 THEMPOKE16526,PEEK(AD+1 }:pDKE16527,PEEK(AD+21 10052 FST+60

10054 28-PEEX (83+11+PEEX (88+21+256 10056 1F 28/32767 28+23-65536 18058 62+28

10060 | TPPEEX | 16396) (32017/EN | BEFUSRO-AD: CMD\*T\* | 10070 | CAR-ADDR-182

10080 EC=1&1 DIR LRP(50) 10090 K90ABS=16400 1 TMS=2 1 BL:32

10300 BATA B021310125993820313E05117C0219E3011313E50400DD4E00E08 BZ3ESFDE1F04410

10310 BATA F07000F5441[F0700]E1352[0400504E0]0900230923[0553E05] 10320 BATA [9E50]1819E50400004E00E0800]1200E042E5F0E1FD4400F070]

GFD 10330 DATA 4401F07011E130CB0500504E0109002300231B01 10340 DATA 0242043F04420B400500

10360 DATA EMB 10370 READ DO 1 IF DO="EAD" THEN 10440 ELSE BOSUB 13000 10380 FOR1=1TOLERIOF:STEP2

10390 D-ASC(MID9(D9,1,1111)D1-ASC(MID9(D9,1+1,111 10400 IFB)37THEAD1-D1-7 10410 IFD)37THEAD1-D1-7

10420 B=(0-49)IT6+2(-40 1 POKE 602R,D 1 60=AD+1 10430 MEXT I 1 5010 10370 10440 DATA 0,[.],2,3,3,2,[.],0

10430 FBR1=11010; READCT11: REXTI 10460 PBKE ZD=6, PEEX (FST+11 10470 PBKE 20+7, PEEX (FST+21 10500 ' CLACULT SET UP

10350 DATA 023E0641043E08400500

10510 TR-33-AM01201; TB-TR:10.1; TR-TR-5; TL-TR-1; CR-0 10520 FGR 1-2 10 TR-2; 018-MR013; -2; CR-CR-018; IFADSICHI) ITHERCA-CR-2001R:018-018 10524 IF PR:-0 PR:-01R

10226 IF DIR THEN IF DIRPRY THEN TO-TO-14:PRY-DIR ELSE TO-TO-61
PRY-DIR

10550 LAPIII-SIR:RERIT 10540 LAPIII-SILAPIIRH-SILAPIIN-13-0:CLS 10542 PRIRITAHA, THE CINCUIT IS "1:FRINTUSING"S.BH MILES LONS"SI 

To reach the final of a Grand Prix race you must first experience a gruelling qualifying round in which speed alone counts. You control a Formula One

car, aiming to complete one lap of the international race track in the shortest possible time. The car travels at top speed on the straight sections of the circuit, but you must steer it round the comers, some of them sharp bends

When the car is steered to the right or left it automatically slows down so a good tactic to employ is to manoeuvre the car as little as possible to keep at the highest speed you can without crashing.

If your steering fails you then

you end up off the track and crash into the rails. Don't despair if that happens, you lind the seconds will tack quickly away building up your had lap time, but you don't have to start the lap again.

You will need o TRS-80 Level II with 16K memory to run this program.

To control the car you use the arrow keys to turn the steering wheel to right or left, but those are all you can use. There is no accelerator or broke for you to take advantage of, you have to rely on your steering to see you through. Be careful not to keep one of the arrow keys depressed because if you do the car will continue turning.

An extra leature written into this program comes near the end of the lap. When you near the finish line the lap record (time to you to beaut) is displayed on the left of the screen, while on the right hand side of the screen your own lap time is shown to see if an extra spurt of speed is needed.



#TUSING\*88:88.8\*LT1.T2/1011TB 5=\*\*

10547 F081-548T0554; TB9-TB9+CHR6 [PEEK [15340+11] | NE1T

16548 ME9-TB9: N=348: 803U821000: FOR1 = IT0200: MEST1: CLS

10570 CLS: PRINTS&71,651

19580 POKE CAR, Sa: RCRASH=15360+733+EC+1: LCRASH=RC+5-28EC-1 16580 9F5-15384: R680=132: R3=13

10590 RPS=15384; ROAS=132; R

10410 SM+LAP(LP1: 1F SM 1HEN RG-132:RG-0 ELSE R0-13

10420 FOR | TOTOTRES RESCUTES LEVERTOL PRINTERS I FOR RESCUED FOR RESCUESTION FOR RESCUESTION

N, MLIPOKE RPB+GZ, NL

10825 1FB=0THEN10800 10830 T=T+2 | IFB=32THEN10700

10650 Z-USR([])PEKE CAR, PEEK ICANI+THG: LC-LC-THG: RC-THG: RG1010

10700 [+USR121:POKE CAR\_PEEKICARI-TMQ:LC-LC-IMQ:RC-RC-TMQ 18710 TENNATHENUERICARINENI 2000

18500 IFFEEKILCI=OLANOFEEKILC-II-BL AND PEEKIRCI=BLANOFEEKIRC+I)

- N ARTO1000

10010 T+T+201 IF PEEKILC1()BLORPEEK(LC-1)()BLTNEK LEFT=0 ELSE LE

10812 L1=PEEK | CAR1+640: 1F LEFT 1HEW L1=L1=17

10615 PRINTALL," 1CRASHS";

19815 FRIFINGL; 4CARDER ; 19820 FR MOTILEFTI THEN BOSW8200001605082001016050820000018080820 000 ELSE BOSW820010160538200001808382001016001820010



10830 FBRL+11050:MEITL 10850 PRINTALI, CHR412011;

11010 T-T-88: IRLP(TKTMEN) 1200 11000 TI-T/SD T2-T-11850-PRINTSRAS, TOA::PRINTSRAS, ...PRINTSRAS,

10030 IF-P-ILTNERFIRTRES-15340. SIRINGSC. 1531\*FINIBLES

,1661; 11200 MEIT LP 11205 FGRI=17510 PRINTSO, CHR6(2551::1\*USR101:MEIT)

11210 1FTCTB THEM MEM "10U BROKE THE LAP RECORD 1"1 M-470(808U82) 000:80T011280

11220 EFT-18>200 PRINTA4AA,"180A BRIVER'S LICENCE HAS BEEN CANCE LLES":1807811280 11230 IFI-TBI100 PRINTA4AA."PERHAPS 100 MEEB A MIDER IRACK':8010

11280 11240 PRINT2464, "YOU'VE DUALIFIES IN "L

10250 PLAGE-ING ((1-001/5))|| FPL=11HENPRING\*|5T\*|ELSE||FPL=2THENP | NEMT\*2NO\*|ELSE||FPL=5THENPHINT\*SRO\*|ELSEPHINTPLAGE\*|TN\*| | 10240 PRINT\* PLAGE\*|

11280 PRIM: PLA

11290 FORT-IT010001NEXT1

11300 PRIM39520, CHR\$ (311] "HIS ENTER TO TRI AGAIN DR"

11305 PRINT#592, "X TO MOVE TO ANOTHER CIRCUIT":
11310 19-180518-1579-CMR44131745N10556-1551919-\*\*\*146N10560FLS51

1310 12000 1F #=32 THEN L1=LC=15340=6:LEFT==1 EL3E L1=RC=15340+1:LEFT

12005 LI=570=PEEK[CAR] 12030 PRINTALI,"000PS'";; FORL=11050;NEITL; PRINTALI,CHRS:(198];

12020 |F LEFT | HEN12500 12030 | IFPEEK(LC) (30LDMPEEK(LC-I) (18L1HEN12600 12540 | GCS-WE20010; SET1012030

12500 [FPEEX:RCI<>BLORPEEX:RC+]|<>BL1HEN12600 12510 \$853820000;50T012500 12600 1-1+10

12620 BOTOLOBIZ 15000 PART+PART+ILIFINIIPART/2182()PAAT METURK

15050 OMPART/200701a000, 1a025, 1a030, 1a040, 1a050, 18070 15040 RETURN 1a000 PRINTSZS. "AA BRANG FRIL 44"

14010 PRINTS192, "10U ARE ABOUT TO TAKE PART IN THE QUALIFYING SE 8510" 14020 PRINT"OF AN INTERNALIONAL BRANS PRIX RACE."

14022 RETURN 14025 FRIND "POUR "FORMULA ONE" CAR IS CONTROLLED ST THE AARON KE 93 "CHISOT METURN 14027 METURN

1800 PRINT\*YOU WILL TRY TO TURN IN THE FASIEST LAP KEEPING IM 9 IND THAT 1" 18033 BETURN

14040 PRING" - EVERY TIME TOU BTEER TOU LOOSE 2/10 OF A SECO

18042 PRINT" SO 100 SHOULD DRIVE CLOSE TO EDSE OF THE IRAC K." 18045 RETURN

19050 PRINT - IF 100 LEAVE THE TRACE TOU'LL SQUACE SACK IN MAIL! LODGE 2 SECUNCS!

14085 RETURN

16070 PRING" - IF 100 CHANGE STEERING DIRECTION TOO SUBJECT.

1604 HILL SKID, LEAVE THE TRACK AND LOSSE I SECOND

." 17000 RE1UMN

20000 1=USR12):POKE GAR,PSEK:ICAR]-TWO:LC+LC-1W0:RC+RC-TWO
20008 RE10RK

20010 2-USRIJI:POKE CAR, PEEKICARI+TMG:LD-LC+140:RD-RC+TWG 20020 REJUMN

21000 FORK+1TQ10:PRINTAN,CHR01192+LENIME+11<sub>11</sub>FOR1=1TD50:NEXT1:PR INTAN,NE+<sub>1</sub>1FOR1=1TO25:NE1T1,K:NETURN

### RUNS ON A

### SHARP MZ-80K

IN 22K

### BY TONY WINDIBANK

The words. Dr Livingstone, I presume", immortalised reporter Stanley's search for the missing African explorer.

Dr Livingstone is lost in darke est Africa again in this Sharp game but no message hos been heard from him for live years. His rescue is your objective in Dr Livingstone, but the African jungle holds many dangers and the porters are a notoriously incide bunch.

Henry Morton Stanley, charged with the job of equipping an expedition to find the great man. To cover expenses you have 150,000 annos which should be used to purchase food, medicine, beads, guns, ammunition and tey the hung of potess.

The dangers include wild animals, diseases, unfriendly tribes and treacherous rivers.

game are: D = number of porters:
F = the number of annus (an African coin), G = number of boxes; C = number of annus (an African coin), G = number of boxes of beads. E = load packs. H = number of guns. K - boxes of amnuntition
The main subroutines are

Native tribe routine — line
 Native tribe routine — line

1300-1620.

• Drseque routine line 1620-1920.

Wild animal routine lines
1920-2190.

 River delay routine — lines

2180-2860.

Writch doctor routine — lines 2860-3490.

Perfect week routine innes

3490-3590.

The game can be made harder by making the minimum number.





TABLE 1 MEM NOVINTE 4 " I TO THE STATE OF TH Laborator (Controlled to Controlled to Contr HEOD FOR U.

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## COSMOS LANBING

The Terran enemy is keeping your planet under constant observation but the drone supply ships must get through.

Ten drone ships have to be landed in secret on the planet's surface, but because of the Terran threat the landing site is constantly moving.

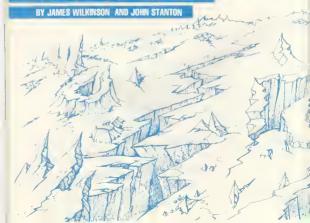
You must land as many of your robot fleet as possible on the planet, using a radio control guidance system. Don't forget that you are operating

the descending drone and not the moving base.

A choice of deecent epeeds ranges from hard to easy (1-3) and when you finish you receive a corre and an acessament of your performance. The game runs quicker than most Sinclair ZX81 programs as the main part of the game is tightly packed from line 180.

Be prepared for some criticism if your drones crash on the planet's surface instead of the base.

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1866 £ 1000 in 156 MZ, ICR 8 is in incordibly good mechanic @ Proleshly the best go place of try in incorespose @ Very for symptomic . A disciplant (ICR) @ Deside whole discipling due to the control of the control

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```
230 PRINT AT 21.0. "31 GRAFHICS SHIFT S
  240 SLOW
250 LET B=(A=2)-(A=25)+B+(AD2 AND AC25)
 260 LET 8=8+B
  270 LET T=T+(IHKEY$="0")-(INKFYS="1")
 280 LET T=T+(T=0)-(T=28)
 290 PRINT AT S.T. "(T)"
 300 PRINT AT 20,A, "SPACE (3+-SHIFT B) (SHIFT Y)SPACE
 310 PRINT AT 20.0."
 320 LET 3=S+1
 330 IF 5=20 THEN GOTO 350
 340 GOTO 250
 350 IF T=0+2 THEN GOTO 380
 360 PRINT AT 5.5. "YOU HAVE CPASHED"
 370 GOTO 400
 380 PRINT AT 5.7, "SAFE LANDING"
 390 LET P=P+1
 400 LET Q=Q+1
 410 IF Q=10 THEN GOTO 450
420 PRINT AT S.T."(")"
 425 PAUSE 200
 430 CLS
 448 GOTO 28
 450 CLS
 460 PRINT "YOU LANDED SAFELY "JP." TIMES OUT OF 1.0
 470 LET W=(P/Q)+10
 480 IF W=10 THEN LET D$="SUFREME COMMANDER OF THE WORLD
 490 IF WO7 AHD W<10 THEN LET D#="SUPPEME AIR FLEET COMMANDER"
 138 IF NOT AND WAS THEN LET DE="PROFFESSIONAL AIRCRAFT LANDER"
500 IF NOS AND WGS THEN LET DE="RINFIEUR AIRCRAFT LANDER"
500 IF NOS AND WGS THEN LET DE="RINFIEUR AIRCRAFT LANDER"
520 IF NOS AND WGS THEN LET DE="I AM GLAD THIS IS GWLY A COMPUTER SIMULATION"
      IF WK2 THEN LET D#="DANGEROUS UNCOGEDINATED IDIOT"
     IF WOI AND WC4 THEH GOTO PRINTDS
 $40 IF NOT AND NC4 THEN GOTOSER
 550 PRINT "YOUR RATING IS
 560 PRINT AT 8,6; "AHOTHEP GO?"
 570 IF INKEY $=""THEN570
     RL94
 590 PRINT AT 1.8; "COSMOS LANDING"
610 PRINT AT 3.0, "YOU ARE IN CHARGE OF THE STAPSHIP ASTRON",
     PRINT"YOU HAVE JUST SUCCESSFULLY COMPLETED YOUR MISSION IN THE OUTEP",
 620 PRINT"LIMITS THE GALAXY"
 $30 PRINT AT 6,0, "HAVING ALKEADY LANDED SAFELY YOURSELF YOU MUST LAHI YOUR "
$40 PRINT"RADIO CONTROLLED DPOHES ONTO THE CONSTANTLY MOVING LAHDING"
 650 PRINT"PLATFORM"
 660 PRINT"TO OPERATE THE RADIO SIGNAL FRESS 1 FOR"
 665 PRINT" LEFT AND 0 FOR RIGHT"
 670 PRINT" THERE AFE THREE DIFFERENT LANDING SPEEDS
 680 PRINT" DEPENDING ON HOW SKILLED YOU ARE"
 690 FRINT"YOU HAVE TEN DRONES TO LAND".
 710 PAUSE 40000
READY.
```

The state of the s

## BHO HINE JOHN

We live in an era of living room economists, expounding their views on whot's going wrong with the country and how they would out it right.

Bad King John is a game which will give you a chance to put your economic theories to the test on a computer model of a simple agricultural society.

Bad King John is the medieval lord of a small island with a population of just a few thousand. To wim the trust of the people he must stay on the throne for 10 years.

The task is made more complicated by the need to keep the population under 3,500 for this period, for rebellion is in the air and if the population rises above this tigure the peasants will revolt and overthrow you.

But weighed against this, you must remember that should more than 30% starve the remaining populace will revolt and bring the monarchy down.

So keep o careful eye on the harvest and the livestock which are prone to rot and plague respectively.

The variables are: Y = years on throne: TI and TS = date; P = population: C = corn. L = live-stock: S = corn to sow: F = corn of corn to feed livestock. SL = livestock to sloughter: NP = compare with P; H = harvest corn. l = looping.



### **By JOHN MYATT**

```
TT=1HT FHE:1 #388+.5
 PRINT"CINSTUCTIONS (YUR)"
CETR# IFA#=""THEN6
  IFA#="Y"THENGOSUB5000
20 PRINT"STHE YEAR 18"; (TS+TT
 @ FFINT" WEOPULATION " F
 E PRINT"ALIVESTOCK ".L
AS PRINTALIVESTORE ".E
43 PRINTEMIONS CORN-".C PRINTEME
41 FORISTO F.100 PRINTEME. HEST
42 PRINTEME PRINTEME.
45 FORI=1TO:L,'10 FRINT's GENT
   SRINT"" ERINT" NO
46 FORI=1TO .C.'10
47 PEINT"#".
54 DEIGHT MA
   IMPUT" STONS CORN TO SOM", S
   INPUT MITCHS TO FEED " F
   IMPUT "MITONS TO FEED LIVESTOCK" JEL
   IFC2-1THEN185
188 FFINT MYOU HAVEN'T GOT THAT MUCH! " GOTG54
102 C=C+F+FL+8 Q0TC55
185 INDUT"#LIVESTOCK TO SLAGHTER"/SL
107 L=L-SL
115 NP=P
     IFF C=0THENP=10
120 P=F+(F.((F+.1))+(RND(1)+.5)+(SL+10)
115 IFC>1888THENC=C-788
126 IFL =0THENL=10
127 L=L*+FL (L*.1))*(RHD(1)+.3)
150 H=S*RND(1)*70
35 IFH (STHENH=S+2
37 H=INT(H)
140 PRINT"THARVEST:",H," TONS"
141 IFH=(S#2)0FHCS#10ANDNOTHC=0ANDSC=0THEMPRINT"AR BAD YEAR' DW
   IFH:S+10ANDH:S+40THENPRINT" MAN AVERAGE YEARS"
```

143 IFHDS#40THENPRINT WA GOOD YERPIN"

## INNOVATIVE

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#### First there was Invaders, then come Asteroids, and now DEFENDI!!

Carrying on in the same tradition, Defend is a fast arcade type action geme, complete with sound effects. Enemy spaceships come all you last and furnously. If you succeed in shooling them down before they get your ships, you spaceships come at you have and turnously in you success an exceeding treats down before they get your affips, you must still get yourself through a melecr shower (but at least they don't shoot at you) and thraily, if you emerge must still ger yoursell inrough a mercur shower toll a rees they soul at danger. An enthratting game with Machine lenguage, of course, for speed. A maller of laste, but we think it beets invaders and Asteroids. Suitable for TRS-80 Models I and III and eli Genie models

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144 TES=ATHENPRINT"YOU SON NOTHING: YOU GET NOTHING" 145 IFC>1000THENPRINT"MROT HITS CORN; LOSE 700TONS1'W" C=C-700 146 IFL>1000THENPRINT"WPLAGUE!LOSET00 ANIMALS!XV L=L-700 147 IEH: 4000RS=0THEN159 :48 EORI=ITOH 149 FRINT"#1": 155 NEXT 159 C=C+H 160 GETY\$ IFY\$=""THEN160 170 IFP<=<NP\*.65>THENPRINT"INTHE FEASANTS ARE REVOLTING!!=".GOTO200 175 IFP23500THENPRINT" DAYOU HAVE BEEN OVERTHROWN! ! GGT0200 IFY>9THENPRINT"3# DNG LIVE THE KING!!" GCT0200 180 NP=P TT=TT+1 189 Y=Y+1 190 GOTO20 200 PRINT "SPOPULATION IS"; P 205 PRINT"ALIVESTOCK: ";L 210 PRINT" WITONS CORN"; C:FRINT" W" 220 FORI=1TD(P/18) 230 FRINT"+"; E-40 NEXT 250 PRINT"W" IF = OTHEN 255 FOR I=1 TO(L/10) PRINT"#" NEST 254 PRINT" " PRINT" N 55 FOR I = 1TO(C/10) 260 PRINT"#"; 270 NEXT 271 FRINT"#" 275 PRINT"XDMANOTHER GO?" 280 GETS\$ IF\$\$=""THEN280 285 IFS\$ O"N"ANDS\$ O"Y"THEN280 290 IES\$="Y"THENRUN 300 END 5000 PRINT" DIDINGAD KING JOHNE" 5885 PRINT"DA=10FEDPLE; #=10ANIMALS/ #=13TONS OF CORN 5010 PRINT"M1 TON OF CORN FEEDS 13 FEOPLE" 5020 PRINT" WI TON OF CORN FEEDS 18 ANIMALS" 5030 PRINT"X5 TONS OF CORN SHOULD MAKE 150 TONS" 5040 PRINT WAFTER HARVEST PRESS A KEY! 5050 PRINT THE START YOU HAVE 50 ANIMALS !! 5060 PRINT"W130 TONS OF CORN AND A POPULATION OF" 5070 PRINT" M1000. YOU CAN SLACHTER ANIMALS; 1=10 TONS 5080 PRINT" NOF CORN. 5085 PRINT # ADD DDD DDD BAPRESS KEY" 5090 CETYY\$ IFYY\$=""THEN5090 . 5000 PRINT"TMYOU CAN' LOSE-IN TWO WAYS 5010 PRINT"MM(1) IF YOU STARVE 30% OF THE 5020 PRINT" MPGPULATION (OR MORE)" 5030 PRINT"MOKE) IF THE POPULATION ORDING ABOVE 3500" 5050 PRINT"WID YEARS" SOCO PRINT!'N GOOD LUCKING 8870 PRINT"MODDDDDDDDDPRESS KEYE" 5080 GETYYY\$ IFYYY\$=""THEN6080 SOOD RETURN

## Adventure

So far we have seen how to create a network, fill it with objects, and decode the player's response. Movement was by typing "N" for "GO NORTH" etc. Now we will progress so that we can use a two word response.

The first problem is that the main, if not only 'moving' verb is "GO", length 2. Our standard sub-string length is to be 3. This can be padded out, so:

can be padded out, so: IF LEN (R2\$) = 2 THEN LET R2\$ = R2\$ + "

and must be done before R4\$ is set or an error will result.

How can verba be categorised? "GO" will change a location, 'TAKE' or DROP' will change the inventory and location number of an object, whilst other verba may have varying and less standard effects. Thereture programming, verba can be placed into one of three categories: Moving verbs; Possession verbs: Others.

Of these (moving verbs) is fundementally different in that the word following, will be a direction and not necessaily a noun. To speed up the string searches it will pay to have a separate direction string from the noun string and only search the directions if a moving verb is detected. So

LET W3\$ = "NORSOUEAS-WESCOT"

Betering to the simple network in Figure 2, we previously entered the cottage from the forces by typing. "N which was found in exit string ES(2) = "N.T.", i.e. using a compass bearing, it would provide variety and add elegance to be oble to rely "CO COTTACE" (even if not funnissic English). The playes would have to be supplied information of a cottage, either in the location descriptions [\$4]) and [\$42] or by a "bail" clue.

"COTTAGE" must now be assigned a direction code: north = N south = S cottage = X I have used X for the cottage

I have used X for the cottage rother than C to demonstrate flexibility, since more than one exit with the same first letter

Marilati	de Can	crigitae	Yeleo in the Example	
News	ne Dan	a april	(where relevant)	
R16	Report I	ricing .	GO COTTAGE	
R25	lat we	and Impaid	80	
R3s	2nd w	ord input	COTTAGE	
845		estera el E2	COT-	
228	shifte F		GOT	
1	cepeb			
LN		d location n	0 1	
Κt	velid !	cerrent		
K2	Yens !	correst	5	
R.C	velid		,	
J	No. of	found wer	1 15	
•	In sea			
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-	19799	to be seen	hed	
COS-	towr :	earyable for		
	alema	et heleg po	agid	
WYS.	Yerb I		GO TAKORO	
W2s	Meen	string		
W3s	Direct	an string	NORSOULASWES	KOI
Wees	Direct	ben cade st	ring NSEWX	
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Pini	Officer	1 location		
LS (m)	Lenal	the descript	ian.	
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Di.imi	Destri	nethant		
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ther	9525 M	asumple di		
\$ Cats		1 Lage	Fig. 2 Simplified	196
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			ong initial ponell	Sh1
2 Fee	051	3 Mazdew	el objects in brack	tels.
UA	10	(2 Caw)	Note objects and I	000
4			Hezz redeponde	1117
N		4 Lakz	pombered	
		(1 Fmh)		

may occur. Exit strings read: LET E\$\l\ = "XS" : LET E\$(2) =
"YE"

Next establish a direction code string that aligns arithmetically with the direction string W3\$: LET W4\$ = "NSEWX"

With these strings together with the string search subroutine previously explained, it all fits together as shown below.



## WHAT'S IN A PYRAMID

Whet'e ie a pyremid? Quite a lol if you compare Scott Adams' Pyremid of Doom with the Tendy version of Adventure Pyremid.

The former follows the usual Scott Adams aght acrees formet while the letter has a coetinuously scrolling display with a rother verbose perrafive style. When the player moves to a new location a response like your ere steeding at the west and of a large chamber. A rough etone steircese lends up bahind you . . . " is not to lanvo him rether confused. aspecially if he has just re-entered the chamber from the opposite direction. Has he turned around, or, ie there a staircase behind him and in front? It was all too much for me after a while, but it seems you either like it or you don't. My wile set up for hours meking maps and notes she even took the hird-stelue end statue-box is her stride! Some honey typing is required in this game, as unlike most Adventuree - naarly all jestructions must be entered in full. l"Inventory" seems such a long word ofter a while!

Pyremid of Doom has some diffigult nexts, but on the whole is easy enough to give the novice sufficient encouragement to persevere - once he has not inside! The playor ien't left with quito the same fanling of lefty galleries and vast chembers that "Pyramid" conveys, because the display is more "compartmentalined". Nevertholoss the leyout of the interior is both cradible and interesting. Naryous tension is creeted by the unexpected appointance of e small nomed, who proceeds to follow the player around. Is he es sinister as he seems?

There is humour to be lound in the Throne Room — but don't hang erosed too long! And don't be fooled by an apparently incorrect accordinates the culprit (Scott Adems can count even if he can't spall!) Pytemid is published by Tandy Machines end runs on the TRS-80 seed Video Genie

Pyramid of Doom by Scott Adems is published by Advecture International and ruce on the TRS-80, Models I & II, Vidno Goeie, Apple and Pet.

## ZX 80/81 HARDWARE/SOFTWARE

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DEFLEX This totally new and very addictive game, which was highly acclaimed at the Microfair, uses fast moving graphics to provide a challenge requiring not only quick reaction, but also clever thinking. One and two player versions on same cassette. £3.95 3D/3D LABYRINTH You have all seen 3D Labyrinth games, but this goes one stage beyond: you must manoeuvre within a cubic maze and contend with corridors which may go left/right/up/down. Full size 3D graphical representation, £3.95.

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## Kit Korner

## FIT FOR FILE 13

Over the post couple of weeks a number of people have come to me with home-built kits which should really have been consident fit for the 13 to the bin.

control to the control of the contro

The boards that I have seen have been coated with a solder mask to prevent shorts on the



encut. This, unfortunately, can be counter productive as it is difjicuit to see whether or not there are any open-circuit tracks around the pods. On the other hand it does help considerably the heavy-handed constructor who is lightle to splash solder about the place.

When making hard-wite use injule core. P. V.C. insulated conusing le core. P. V.C. insulated conducto as this can be consily straightened and can be bent at right-angles. unlike the multistranded types. I use 10.7mm gruge. I also make use of an earny colours as possible and take noted where I have used at the noted where I have used in the can be used to the care of the

ing, heading up the wire and then stripping you can ensure the retaining the common of the common three control of the common the control of the common three could be compared that you do not crimp the wire too much not occidentally cut if if you are stripping with cut tere or a kine. Again, double check that the link is good, either by a physical test — by trong to lift the ware off the board — or by a continuity test.

As a general rule, the neotes the board appears, the more selarible it is. This may be only because it requires more care and attention to produce one. Wrises which memode about the board are unstightly and are prone to physical stiesses and strains, whereas a connection mode tight on the top of the board looks good and is difficult to interface with.

It must be remembered that any links that must be made, unless otherwise spectred, must be made either completed construction. As well as uring oil of the available colours, Itry to put in the shortest links first, gradually building up to the longest, which on some boards may be from one end to the other. Take care not to hide any of the shortest links first of the board with the care not to hide any of the shortest links are to the care to the care to the care to constitute the care to colour the care to care the care to colour the care to care the care the care the care to care the care to care the care the care the care the care to care the care the

If you are not able to use single-stranded wire I can suggest a few points that will help to ensure similarly good results for sifty out had. When measuring the spacing of the holes allow about an extra 3 or 4mm after striping. The the twisted strands as many control of the strands of the s

The wire should be slightly loose in between the holes now. When you come to solder the first end, hold it still in the hole and secure in position. At the other end gab the tinned end ond. as you solder, pull lit through gently. The insulation should soften and fold back against the top of the board. The wire should now be tout. The procedure in all the

other aspects of construction are

When lines, such as those for control, are required to be taken off the board the most professional way shy an edge connector. However, many kits do not come supplied with these and they are sometimes expensive options.

The alternative to soldering directly into the board is to put single or double-wided pins in the board and solder to these. This means that, so long as the exough, the wires can be removed without moving the board if it has been screwed down. This, if have lound, is the most cost-effective of all the by sleeving the connections with Py. V.C. or sithoon.

Lost, but not least, our February gripe goes to a number of componer who modify computer boards i must congratulate them for such a difficult job well done. The boards I have seen have mostly been U.K.101's but there are other conversions on the market for other makes. The worst one had been modified for increased memory for the sceen is order to a tight.

The bottom of this board looked like a plate of ficilian spochetti. The wires were very hight of the spochetti. The wires were very light if mean 35 or 40 gauge. Somehow the board will work. Don't have board while the board while the use and eventually there was one wure which come odn't II only the compony had sproyed the board with a PC-B, loquer all would have

Despite this setback the machine works perfectly now, with no problems except those of the programmer. He keeps forgeting that he now has 4K of screen memory so that his graphics just take up a quarter of the display!

## BY KEITH MOTT

## Make the most of your Sinclair ZX Computer...

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volume of programs written by use ORRIT - your space craft's program is carefully vetted for can you spot and shoot them when

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cassettes are sustable for running augmented by a 16K-byte add-on

This RAM pack and the replacement ROM are described cassette makes it clear what

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careo rhat's in orbit around a star. SNIPER - you're surrounded by 40 of the euemy. How quickly

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consistive in the commutate world WOLFPACK - your usval destroyer is on a submarme hunt

The deoth charges are armed, but must be fired with precision. GOLF - what's your handscap? It's a tricky course but you control

#### Cassette 2-Junior Education: 7.11-year-olds CRASH - sample addition - with the added attraction of a car crash

if you get it wrong.
MULTIPLY-long multi plication with five levels of difficulty If the auswer's wrong

the solution is explained against the computer The winner's train reaches the station first. FRACTIONS - fractions

explained at three levels of difficulty A reu-question resi completes the program
ADDSUB - add storn and

subtraction with three levels of difficulty Again, wrong answers DIVISION - with five levels of difficulty, Mutakes are explained graphically, and a ranuing score is

SPELLING-up to 500 words over five levels of difficulty You

#### Cassette 3-Business and Household

For ZX81 Land ZX80 with 8K BASIC ROM) with 16K RAM nuck TELEPHONE-setupyourown computerised telephone directory and address book. Changes. 50 entnes are essy

NOTE PAD- a nowerful, easy-



Use it as a diary, a catalogue, a

sonhisticated finaucial recording documentation. Use it at home to goes,' and at work for expenses. departmental budgets, etc.

#### Cassette 4-Games For ZX81 (and ZX80 with 8K BASIC ROM) and 16K RAM back

LINAR LANDING - bring the luuar module down from orbit to a soft landing. You control artifude and urbital direction - but watch the fuel esuge! The screen displays your flight status-digitally and graphically, TWENTYONE - a dice version of Blackrack

COMBAT - you're ou a suicide space mission. You have only 12 12 of them with your

SUBSTRIKE- ou patrol, your subs. Can you depth-charge them CODEBREAKER-the computer thanks of a 4-days number

which you have to guess in up to 10 tries The logical approach is best! call, you've narrowed down the search area to 343 ruber kilomete uf deep space. Can you find the astronaut before his life-suppor system fails in 10 hours time?

#### Education: 9-11-year-olds For ZX81 (and ZX80 with 8K BASIC ROM

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### BY DAVID ANNAL

Sound is an important selling feature of many of the new generation of microcomputers but it has not always been taken for oranted.

Producing sound from a Pet. for example, is a simple process but many readers will not have realised, for example, that the Nibblers Pet game in the November issue, incorporated sound.

This method of generating sound was seen on several of the first and second generation microcomputers. Computers now mostly use dedicated chips producing 3 or 4 nates at the same time, controlled by specially invented Basic words such as "Music", "Tempo" and the like. Examples include the Dai, Atari, Sharp, and the new BBC computer. Note production is simple, eg. to play the note middle C one might simply enter a Basic line — 10 MUSIC C.

Many computers exist with no such refined system and it is these to which we direct our attention this month. Most, such as the Pet. have the necessary peripheral interfacs adaptors (PIA), or versatile interface adaptors (VIA), built in. ff not, they can be added quite simply and memory addressed. To make matters clear, addresses given below are those used in the Pet but the principle involved is the same with any computer. A Basic POKE statement puts the number after the comma into the memory before the commu.

sound and amplified comes down a single wire in the form of a series of "I"s and "O"s. The waveform and "tone" can be altered by the ratio of the number of "1"s to "9"s and their distribution. The frequency of the sound heard is governed by the speed of their production.

Information to be turned to

A simple way of achieving this, and the method employed in the Pet. is shown in diggram 1. The eight bit register is filled with a pattern of "O"s and "1"s, in the example shown, it would be POKE 59467, POKE 51466, 59466, 15

ADY. REM PROGRAM 2 — 27 A=59467: B=59466: C=50464:

N =250 POKE A, 18: POKE B, 37 FOR R -1 TO B FOR T =1 TO 200 STEP 3 POKE C, N-T NEXT T NEXT R

59464

Address Function 59467 Register Mode 16 -Fres running under timer control 59466 Main Shift Register

Delsy No. far timer cauntdown the decimal No. 15. A control location is set so that the register is now shifted one place to the right under the influence of a

timing circuit. Each but on reaching the end of the register is returned and inserted back at the beginning again but it also passes down the output line at the same time.

In simple terms, each "1" represents a voltage of 5V and each "B" a drop to OV, so in our example, the output would be high for four shifts and then low for four shifts. This pottern is repeated as the register goes round and round and results in a square wave output (figure 2). The frequency of sound output

Diagram 1. Skitt register of midrets 19466 00001111 En Set al Dec. 18

Datest and (CB2

is made to vary by introducing a time delay before each shift takes place. In the case of musical sounds, the delays are very short and are set on the chin itself, which counts down from a preset number in one of its timing registers.

Each time the loop reaches zero, the main register is shifted by one bit and the process is then repeated. We now have control of the pitch of the note produced by varying this delay number. The higher the number, the longer the delay in counting down, the slower the rate of stepping and thus the lower the

To obtain sound, the output line (CB2 from pin M of User Port on Pet) is simply connected to an amplifer such as that described in issue two and an earth return made to digital ground (pin N). It can be taken direct to your Hi-Fi but, in order to protect your computer from any short circuits or surges, it is always advisable to insert a resistance in series with the output line - one of 100K will

suffice here. Program 1 should now be easy to follow, First, in line 20, the VIA shift register is made free running under timer control as discussed above (several options exist but this is the most useful). Next, the shift register is filled with a pattern of "DGCC01111" = 15dec. Finally the delay loop countdown is set at 117 to give a note of C. The delay in line 50 is a Basic one and governs how long the note will sound before it is turned off again in line 60. Note that the control of the shift register is built into the VfA chip (in this case a 6522) and so any computer can control it - only the memory locations allocated to the various control registers

will be different. What does Program 2 do? All kinds of effects are possible by using Basic to alter the byte in the shift register and the delay number.

A flick back to the Nibblers game on page 47 of the November issue. Note lines 10. 350, 430, 545 and 690. Their function should now be crystal clear?

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**ELECTRONICS FOR THE 80s** 

70 COMPUTER & VIDEO GAMES

## BY GARRY MARSHALL

Good graphics add playability to games which are hung ground a theme. And the more detail which can be included in a drawing, the more believable

the game will be. High resolution displays can be achieved with several microcomputers. These include Apple Il and the Acorn Atom. The Apple II with Applesoft gives a resolution of 280 data horizontally and 192 vertically, while the Acom Atom with a full complement of RAM provides a resolution of 256 by 192. The high resolution graphica commands available on these micros include commands for moving the "drawing head" to any position on the screen, and for drawing a line from the current position to a position specified in the command



The following program causes a rectangle to be drawn near the centre of the screen with on

Apple. 10 HGR2 20 HCOLOR = 3 30 HPLOT 60 60 40 HPLOT TO 60, 160 50 HPLOT TO 180, 160 60 HPLOT TO 180, 60 70 HPLOT TO 60, 60

80 END Line 10 sets the high resolution graphics mode, line 20 sets the plotting colour to white, and line 30 plots a dot at the position in column 60 and row 60. Lines 40 to 70 cause the sides of the

Good graphics are an eften the mark of a good gama. So many computer games ere given tiln by baing hung around a thems - whether a destructive, you egainst the eliana struggle, or a tactical wargame scennrio. The more detail you can out into a

quantical representation of the theme the more accurate the final result can be. High-resolution graphics is a popular option with computer games players. In this column we look at this facility on the Apple and Acorn Alom.

rectangle to be drawn. The location of the rectangle on the screen is shown in Figure 1. In similar fushion, an Atom

will draw a rectangle with this program. 10 CLEAR 4

30 MOVE 60, 60 40 DRAW 60, 180 50 DRAW 180 160 60 DRAW 180, 80 70 DRAW 60 60 80 END

Each line of this program is broadly equivalent to the line with the same number in the Apple program. There is no need to specify the plotting colour as the DRAW command automatically produces a white line. The point in row 0 and column 0 is at the bottom left of the screen with the Atom as opposed to the top left with the Apple.

Now, just as we have drawn a sectangle by joining four points together, we can draw any shape by joining a sufficiently large number of points. The more points we use, the more accurate the drawing will be. Outline programs for drawing any shape are given below. The Apple program requires the number of points to be loined to be given in the first data statement (in line 40) while the points themselves must be specified in the data statement at line 110. Other data statements can be included if necessary.

10 HGR2 20 HCOLOR = 3 30 READ N

40 DATA 50 READ Y Y 60 HPLOT X. Y 70 FOR 1 = 1 TO N 80 READ X Y 90 HPLOT TO X. Y 100 NEXT I 110 DATA 120 END

A broadly equivalent program for the Atom is given below Since Atom Basic does not posmess READ and DATA statements, the program uses INPUT commands so that the number of points and the points themselves must be entered when the prodiame is run. 10 INPUT N

20 DIM X X (N), Y Y (N) 30 FOR 1 = 0 TO N



40 INPUT A. B. 50 X X (1) = A; Y Y (1) = B 60 NEXT I 70 CLEAR 4

80 MOVE X X (0), Y Y (0) 90 FOR 1 \* 1 TO N 100 DRAW X X (I), Y Y (I) 110 NEXT I

120 END

Figure 2 shows a drawing produced in the way described by these programs, It can be tedious to find all the points which have to be joined. A digitizer is useful to obtain the points in an painless a way as possible. There is a digitiser for the Apple.

There is little more frustrating than reading about a marvellous game which is unavailable on your naticular microcomputer.

And, unless you are familiar with the other machine's Basic. modifying the game to suit your computer is a daunting task. Hardware and software vary

so much that there are no general rules for converting proorams, the conversion process may require anything from minor changes in syntax up to almost a complete rewrite, and be anything from a bare program listing to a full explanation of the purpose of every section.

Manuals are usually available separately from the dealers who sell the machines, and if you intend to convert a fot of programs you will find it very useful

to have many computer manuals. changes needed, will be to the display on the screen. These changes will be needed because the memory addresses, the graphics characters, and the ous models of computer avail-

number of rows and columns on the screen differ among the variable If you have the machinedependent information on graphics and screen formats. which can be obtained from the manuals, and understand the techniques of memory-mapped screens explained in Garry Marshall's Graphics series you should have little difficulty in converting most programs.

Hardware differences, such as input from a joystick or light pen, or sound output, can cause diffiguities. If you do not have these features on your computer. sound output can be omitted and lovatick or light pen input replaced by input from the keyboard, but such changes may destroy the point of a game, If you do have similar hardware features the conversion is often studiahtforward, afthough you may sometimes have a lot of work to do because of the different software features available

Most dialects of Basic have a common core which varies little from machine to machine. Most of the differences are in the instructions for controlling special features, such as sovsticks and colour graphics

There are few differences in most frequently used Basic statements and it is usually quite easy to make any changes that are necessary Apart from special-purpose instructions used for controlling peripherals the only instructions likely to cause any difficulty are PEEK,

and POKE is in memory mapped graphics. Other uses may be concerned with the computer's furnware (the built-in machine code modiams in ROM that control the operation of the computer) In this case you will have to find out what the instructions are

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doing and replace them with instructions to perform the same task on your own computer.

Some programs include mochine cade subroutines that gre POKEd into memory and accessed by the USR or CALL instructions. Unless you are lamiliar with machine code or assembly language you are unlikely to be oble to use such machine code subroutines, even if your computer contains the same microprocessor as the machine the routine was written for. Machine code subroutines often use the ROM routines, and even il they do not may use areas of memory that are not free on a different model of computer.

Although I have concentrated on the difficulties that can arrise in converting programs, most of these difficulties occur only occasionally. Ones you have got more consistent of the consistency of the co

## NUMBER CRUNCHING

Many mathematical problems and puzzles appear at lirst sight to be suitable for computer solutions as they seem to be solvable by massive amounts of simple calculations even if you don't know the mathematical methods for solving the problems directly.

However, Basse works very slowly, cithough the result of a simple addition or multiplication may appear to be printed instantly, hundreds of thousands of such calculations will take hours. Thus it is usually necessary to reduce the amount of calculation needed, and it is often possible to do this with only elementary mathematics.

Let us look at the problem of finding whole number solutions of the equation:

 $A^2 = B^2 + C^2$ 

There are, in fact, an infinite number of solutions so we need to fix an upper limit to the solu-



tions we are considering, say A=100. The obvious way to start is to test all triplets A,B,C less than 100, using something like the following:

10 FOR A = 1 TO 100 20 FOR B = 1 TO 100 30 FOR C = 1 TO 100 40 IF A\*A ·B\*B + C\*C THEN 60 50 PRINT A:B:C 60 NEXT C 70 NEXT B 80 NEXT A

However, this took six-and-on-bill minutes to find the smallest solution, A=5, B=3, C=4, and would take aimost three hours to run to completion. It will also produce such solution twice: e.g as well as A=5, B=3, C=4, it gives A=5, B=4, C=3, which is not really distinct.

We can make the program much loster, and eliminote the redundant solutions, by noting that A must be greater than B or C and we can arbitrarily chase to have B v. Thus we need only test those coses where A -B and B v.C. This could be done by inserting two extro tests between lines 30 and 40, but it can we have a like a but it can be seen to be suffered by the service of the service in the FOR.

NEXT loose, It lines [10-30] are

replaced by: 10 FOR A =3 TO 100 20 FOR B =2 TO A -1 30 FOR C =1 TO B -1

the running time will be reduced to 27 minutes, which is over six times as fost as the lirst version.

The problem does have an unthematical solution which can be derived very simply, although the detoils of the derivation make it too long to include here. The details of the solution can be found in climost any book on elementary number theory, and does not require any

special mathematical knowledge for its understanding.

The solution is that all values of A,B,C satisfying  $A^2 = B^2 + C^2$ 

can be found from the equations  $A = P^2 + Q^2$ 

A = P' + Q' B = 2\*P\*Q  $C = P^2 - Q^2$ It is easy to see that this does

give solutions, since

A<sup>2</sup> = (P<sup>2</sup> + Q<sup>2</sup>)<sup>2</sup>

-= P<sup>4</sup> / 2\*P<sup>3\*</sup>Q<sup>2</sup> + Q<sup>4</sup>

while  $B^{2} + C^{2} = (2*p*Q)^{2} + (P^{3} - Q^{3})^{2}$   $= 4*p^{2*}Q^{2} + P^{4}$   $= 2*p^{2*}Q^{2} + P^{4}$   $= P^{4} + 2*p^{2*}Q^{3} + Q^{4}$   $= P^{4} + 2*p^{2*}Q^{3} + Q^{4}$ 

The less straightforward part of the derivation is in the proof that these lormulae do actually give all solutions.

give all solutions.

It is a simple matter to write a program to produce solutions from the formulae above.

10 FOR P = 2 TO 1000
20 FOR Q = 1 TO P-1
30 LET A = P\*P + Q\*Q
40 LET B = 2\*P\*Q
50 PRINT A-B:C:

70 NEXT Q 80 NEXT P When this program is run the solutions shoot up the screen too

fast to read; values less than 100 come out in a few seconds, and within ball an hour the program is giving solutions with six digite.

This shows the enormous odvantage that can be guned by using a little simple mathemotics to solve a problem, rather than relying on the Brute force and ignorance' method of the irist program above, which will produce the answer but may fie up your computer for hours or

even days.

COMPUTER & VIDEO GAMES 73

## THINK THINGS OUT IN 3-D

Sixth Sanse is a misleading name for a came which requires you to

From the Milton Bredley stable. Sixth Sanse is a double game Firstly there is a 3 D ver sion of the Connect Four came and secondly a 'maza" game The object of the former is to to place four counters in a row no different levels

Altogether there are lour lavers of the trame in which to place your counters with a total of 15 spaces. The counters you play with are actually square shaped cubes which slot into each space

Remember to check the counters on the bottom level of the to see when they have been built unon When one of you finally wins a victory time plays In the second game your task

is to follow a pre-programmed "maze" pattern which is lormed you when you have made an incorract move and you can only moved into the correct space You cen take consolation in

the knowledge that the maze only tollows a vertical and hour zonial path, it won't go disgonally it will not descend again

The winner of the game is the the maze Sometimes you might have to use your opponent's counters as a scaltold to climb to the right level in the maze Each player is given the same number of moves to complete the muze Sixth Sense is scheduled to be

on sale in most large toy shops from July of this year and will cost £17 59



The British toy industry spends January and early February unveiling its plans for the coming year. Here we present a selection of electionic games and toys which witi be compeling for our attentions next Christmas

type game seams to be following in the trend set by Space In vaders and appearing in every concovable formet.

From Adem Imports comes Mini-Munchmen which can be played on the tiny screen that also donblas up es a watch About the same size as an eyer and calculator the clock has foll functions, including a stop watch an elaim, inc times, day and date There has been a plethora of

hand-held Munchman type gemes but this is the first to be The game itself sticks closely to the original varsion with the

player in control of a munchman who rushes around the screen

esting dots as he coes Mini Munchman's makers Adem Imports enticipate supplies



Leet was a microfit successes and should lifter into the shops in this year's toys. The Puckmen, March reterling for about £18 In the same series, is a gol name which will also cost £18

This game egain is unique for the range You control a golfer who has to swing his way through a nine hole course it has little lectures incorporated into the came to give the player more information, like figures display ing the distance the ball is away

from the hole he is playing Adam imports says that the skill of the game is pressing the but ton at the correct time when the poll club is on the back swing

## SOUPED-UP SPACE INVADERS

A sophisticated space invadits hend held name will grace shot shalves later in the year keaping the ciaze lingering on

Called Alien Attack the object is to shoot down as many aliens as you can You have these keing shine letted with lase is to blast at your attackers At the start of the game the alians move onto the corners of the LCD screen and fring beems as they liv The



"meenies" come in waves of eix but once you destroy those there is no let up another betch will be instantly pent on the impage There are two skill levels and

many different speeds to master Alien Attack is one of Peter Pan Plaything's new toys for 1982 It was originally relansed to lum Colaco The game does however fall at the top end of the price range rateding at around

#### CHIPS ARE CHILD'S PLAY

A treat to children with a taste Do a touch sensory surface

children can learn to play and sing along to their favourite stories with this new electronic toy. The microprocessor hidden inside the toy memorises the tunes and when the correct colonied button is prassed the corresponding note is amitted Celled the Musical Story Book the Lov has two different octaves and an automatic shut-down davice, acting as a power saver In case of forgatful children who leave it on

Corning in a square shaped owen, the board consists of 64 knys which represent the notes

played At the lop of the eight columns the letter of the note is stamped in large latters making it

easy for the child to read With the actual toy comes a selection of cards on which the stones are written. To play the tune the child reads the cord following a "road" map consist one of lines linked up by circles containing the collect musical

Included in the list of musical stores ere Happy Birthday and Ba Be Blackshapp

Peter Pan Playthings is the firm behind this toy and has assigned it a price of £18 it is off one nine volt battery which is not included in the package

## **LEARN THE SECRETS** OF THE DARK TOWER

Justino e bend of warriors to hidden in each of the citadels overthrow the forces of the fout none in your own so you bridend king who has stolen a theme of a new concept in cemes

Dark Tower is a unique idea combining a traditional board game with an electronic game The centioniace is the lower itself which is mounted in the the tower is a large 'window which acts as a ecisen and shows each player what is hap

On the board are marked lour citadels containing a tomb. a sunctuary, a bazear and mina the dustion of the came The ultimals aim is to attack the Gerk Tower and oust the avil bugend

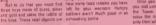
But to do that you must find and gold and solve the uddle of

have to move around each citadal people's precious eceptie is the in a clockwise direction to obtain the lensures You use plastic models to rep-

the game and move them stound

At the beginning of the come. each of the four players is allo cated 10 warmers, 30 bags of gold and 25 food intions. Anything can happen to you on your travele and you must waich out los hadden dangers which might balall you and your soldiers. Like the fire-breathing draggn which you could our into as the tatal plaque that can kill off helt your earny Somotimes you will inevitably have to set to bettle with some

of the other brigands in pursuit of their keys Throughout your malitary care paign you must kamp an eye on how many lood intions you have



## MAGNUS' MICRO RIVAL

Practice snanning back answers to general knowledge questions trom a know all toy which would give Magnus Magnusson a run tor his money

Joining in the Mustumind test of general knowledge, this new toy is designed for the sollis family Altogether thera are 19 different subjects for you to answer questions on when you also Femily Challenge This supplied with the toy e total of 1.001 questions end contains a number of special lea-

You can begin the geme's play on any question you choose by pressing the selection button, so it you don't fancy your chances on the one hist posed you can nick another

If there are several difficult questions in a low you can uso the fast forward button to advance the process quickly Lights and sound help brighten it

The UK distributor is Pater Pan Pleythings of Percibolough the £50 mark Femily Chellange is the big brother of Master Chall lenna also made by Petos Pan

A backlet of new questions for Master Challenge is also new out. Altogethms them are 1001 vision quiz programmes like Ask the Family Mastermind and A Question of Sport All for £8.75

The booking contains quiz gunstions and can be used with the new came Family Challenge is bettery iun, but they are not





You can replenish your sup plies in the bazants using your cold, and you can even hacole to hong the price down if it's too

To make a move in the name you must piess one of the butthrue mie 12 in mil - to indicate where you want to move to Afre you have pressed a button a reasonse and turther directions will firsh up on the scient to you to follow The lower swynis round so that only the player whose turn it is can

see what the window inveals Once you have tound the keys you still can't rush in and storm the Town Fast you have to solve the nadle of the keys for only then will the portcuits onen allowing you to lay seign it you win the town plays a victory tune and the intrinved sceptie is held high in triumph Belois merching into battle make sure you have a nough troops to stand

This Milton Bredley game has the notential to be one of the most sought-after of 1982, and is certainly one of the most imaginative of this year 5 batch of new leunches. It will be on sale later in the year for £30 from most laice toy shops

a good chance of success

#### A GAME TO SINK YOUR TEETH INTO

Your blood will start to curdle when you sink your teath into

When your fingers touch the chilly casing of the electronic came Discula, you sit con funited by the plan of a registed house. You have to find your way. abyous denous of colfins (which and that carticularly poisonous type of bat which files in heavy numbers through hounted houses

Dracule is an extension of the sence which Adam Imports brought out lest yeer. It will be evertable in a plastic cusing con the control push buttons are player to look at displaying the action of the game

The object of Discula is to los obvious reasons If you get too close to fus fangs

Halactunately it won't be in the shops until July at the under the £30 mark

Astroblecter is the new Imports' Astro Wers It is in the same vein as that game but fol lows the arcade game Scremble On the housental display you see an undulating lunar surface which constantly changes as

Verious when spece craft and creatures fly lowerds you at intermittent periods. You score points by successfully shooting down the enomy shins and by

Astrobinstor is also expected to sell lor just under E30 and should be on shop shelves at about the same time as Diacula

## DETWARE SOFTWARE SOFTWARE SOFTWARE SOF

#### **OUEST FOR** HIDDEN PLUNDER

PIRATE ISLAND

Piratas are common inhabitants of adventnio games and as avery schoolboy knows where there mo pirates, treasure is never far

Supplied on a C12 cassette. Puete Island loads in two parts corresponding to the two memary blocks of the Atom and do: ing the second load instructions are presented on the screen This gives you something to look at while werters for the cas-

sette to finish the load. The object of this first and exciting game, is to collect yen ous items of treasure and trans nort them back to your ship while avoiding many obstacles and becaute ninced in your oath.

In common with other seven tine cames the computer incomnises commands typed in English such as 'North', "Up", "Est the Sandwich" and so on.

The machine raplies with "1 can't" or "I don't understand" if the command is not recognised or encorrectly phiesed and

ellows another attempt Thorn is a small screen flash ofter each input, but it is at very short dination and after a short while becomes nnnoticable Altogether there are over 30

locations and more than 25 objects which will be required during your hunt for treasure This is achieved by naing only five bits per character instead of the usual eight, thus making the propiers appear larger than the t2K Watch out for personous darts, crocodiles, gorillas and of course, pirates



Useful things to pick up min a tindes box pieces of sight, a knits and a oseen eved golden

Pitale Island is an easy and compulsive game to play, but inpulies skill and a certain amount of lock to get the best some which is shown at the and of the game. Yes, the best score,

16 out of 16 is nassible? The program is written in machine ceds and uses on the whole 12K RAM of the expended Acom Atom, it is available from Hopesoft of Newbury in Barks. An excellent pince of software it is well worth the £6.75 pics tag

but use lantestic graphics Space Eops can be found in the sicades under the name Moon Cuerta

The game is a valiation of the nsual space inveders thame whereby the olsver has a revetick type control to move the space ship from left to unbt and a fee batten. Three levels of difficulty

A three part space ship solits up given you thise attempts at destroying the ages Unlike the usual games, when you destroy an egg a space thing appears ont of it with a number on it. The number indicates the points awarded if you hit it

Unfortunately the space-thing moves very exceptionity, usually in the direction of your space ship It it thuckes you then that's it.

Soace Wallion involves the roleting apystick to move a static spaceship that is sprenginged by a force field Atlacking space cueft our destroyed by lines unthe space ship and pushing the fire builton. Apain the space craft. follow stratic paths making defence difficult

Marvellous questics and a families space battle theme, the gemes rely purely on speed and senctions but they seem to give bonis of encoment to those in

saily toens and youngs: Both sis systable from Pate and Pam Computers to: £13.95 each to run on an Apple II For Space Eggs you need 48K mampry and 32K for Space Warner

## HISKED INTO ACTION

ARCADE SCRAMBLE

Thate's plenty of action when vons craft takes to the skies in Arcade Scramble And the good quephics make this nichde spin off a cnt above most others

The mission thems which gave Sciemble a big sicade following is increated with plenty of hazards for the player's plane You have six centiols which

use the snow keys for letter keys if you wish) to alter your altitude, give forward and revaise movement, drop bombs and fire your ouns.

The pame is written in machine lenguage, and efter loading it we the system command and seeing the title page you are givan a cross saction rapiesentation of the enemy territory with mountains, valleys, ipcket leunching pads, ack ack pads, forts, munition dumps and fnel

Your plane flies across the screen whilst the ground unfolds beneath you from right to left Using the controls, bomb the anomy posts without flying into the landscapa Forths) hazards include enemy missiles, clusters of bumbs in the air iwhich you must evoid) and eck-eck from enemy our posts. Without warning snemy sucreft appear to intercept you and you either have to dodge or shoot them

The game is not difficult to learn but does take some practice to echieve a satisfactory score Should you have a suitable amplifier connected the game provides arcade type sound

The gema inns on a TRS 80 Model 1 and a Video Genie and The cassette costs £9.50 from Kansas City Systems



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# FTWARE SOFTWARE SOFTWARE SOFTWARE SOF

#### DANGER IN THE DEPTHS

HALLS OF DEATH

Down into the depths to face dangar and sain your rewards. the standard adventure game former is rollwood in Halls of The object of the game is to

explore the various cave levels of the Halls of Orath, collecting treasures and slauchtenno mon sters belore you ore killed

Il you do manage to get out visu are given a rating based on the treesures you have been able to return and the monsters you have killed. The deoper you go, the nasting the monsters (watch out for that Mummy) and the greater the treesures that can bo found ? liked the Oregon! Movement around the levels is

we the number pad in the issual menner, other commands are promoted on the screen -- usually inquesting the onshing of one letter or onother. The gro grem gonerates a player for you with certain characteristics There is an option of saving characters at the and fil they auryive) and reading them back into the name to continue playing next time

One of the best features of the game in the combat, which has o reabstic points system. Il you remain undocided on what to do, your opponent carries on fighting - usually with nasty results

Watch out for some special effects from some of the monsters - it pays to run from some

You can try out spalls too, but you don't know what they do notil you try them, They turn out to be steep, teleport, lightning bolt, fireball - won betide you if you don't have enough spell resolution graphics and needs 5K points when you start using them

One fault the game has is that the screen if you push the wrong key in epell use, but this is e minor fault in a game that I lound quita compulsiva, expecially as f tended to get killed at the most interesting point! It inch on a Pet in 16K and costs £14 from Super soft of Middlesex



## FENCING WITH ALIENS

SPACE INVADERS AND PINBALL

Spaceway bonnes the elect moved are back to your scient but outs them behind a well This cines between Source

Invaders and Breakout has kamikaza aben spaceships trying to knock bricks out of a well which it is up to you to defend. Every 1,500 coints a new bei ries magically appears to roplaco

the old battered one Your resources amount to five tases hases which seem netty meager when compared to the olian commandos, who has 400 craft at his disposal

If you manage to dostroy all the eliens a message appears telling you what a hare you are But there is one small bug in the program, when the last bose has been deatroyed the firing sound affect still continues whenever you pless the file key

De the same Acoin Atom cassette is Pinbell, a version which is the beat I have yet seen on a compute: The gome uses low of text speco momory, so it will run on a somi-expanded Atom In this version of Pinball, the

it is possible to ruin the map on table has been put on its side so that the fingers are on the left hand side of the scient rether than at the bottom. This makes the game slightly more difficult to master if you are used to flading on normal pinball machines but you ahould soon get used to it. The game

becomes very fast moving and a great amount of skill and concontrotion is required to get a good score. You are allowed up to nine bolls with which to try to cut no to 999,990 (you'll never do it) although a score of about 190 900 in made reasonable

Naither of these comes need o floating point ROM On the same CHSSettle but more discoppinting are, Drive and Letters which make up the four gemes Still et only ES from Timedata I would strongly secommend this cassatte to all Acoin Atom users

#### BOUNDARIES. **BOWLERS AND** STATISTICS

WINI-CRICKET

If there is a statistical committee the ZX81 would be good at, it must be cricket. Unfortunately Mini Cricket only makes a fair affort at simpleting the one day

Mini-Cricket Is a game for two pleyers egainst each other or one player against the computer On loading the piporam the ZX81 esks you what type of game you went to play, one or two players? The computer then goes on to esk you to name you teem and the f1 players in it, of these, four bowlers must be nominated. The computer tosses a coin and tells you if you are batting or bowling The main display, a scorecuid

is then printed up on the scient You are asked to nominate a bowler for the first over or - if you are batting - whether you want to attock or defend

This happens every over and there are 20 in each innings Bowle is nomination is necessary as some bowlers are better than others Those two choices are the priviones you are allowed to take end make the piporem slightly disappointing in that

After making your decision tho scorecard will alter overy bell to tell you who is betting, how meny runs were scored off that hell. elter the team total and nodate the bowlers' figures If it is the second innings, you are told what the opposition had scored at the same point in the first innings, a rice touch that adds a bit of excitement II the scorecard Hashes "Dwzet" you have to wait los the umpes the ZX81 - to make a decision

Unless you are a cricket buff this is a game that will only be played now and again it is not enough of a simulation to replay actual games and is theirfold slightly disappointing The documentation is excellent and stands os a teiget loi other soft ware suppliers. Mini Cucket is evortable from Errope Softwas of Eythem in Lancs and is priced ES 95 and needs 26K of mamony



# BASIC

BY MOIRA NORRIE

## GIVE LUCK A CHANCE

Most games involve some element of "chance" or "luck". This element of chance is introduced into a game by actions such as rolling dice, shuflling cards or spinning a wheel.

For any such action, we know that each of the possible outcomes is equally likely to occur. When you roll a dice, you may get g 1 2 3 4 5 or 6. The chance ol getting g "l" is no different from that of getting any other of the numbers. By the action of rolling the dice, you are selecting one of the numbers at random. I will now show you how you can introduce this idea of chance in your programs.

In Basic, there is a function RND which selects numbers in the range of 0 to 1 (not including 1) at random. Every time the computer encounters ("RND" in a basic program, it will select another number between 0 and 1. To illustrate this, try running

the following program

10 FOR 1 = 1 TO 20 20 PRINT BND 30 NEXT 1

40 END

A list of 20 numbers, each in the range of 0 to 1, will be printed. They will appear to be selected randomly in that they will not follow any obvious pattern. In fact, these numbers have been generated by the computer using a mathematical rule which produces a list of numbers with this property of "randomness". This mathematical rule is called a "Pseudo-Random Number Generator" - meaning that it generates numbers that appear to he random.

Different computers use dilferent Pseudo-Random Number Generators. As a result, the operation and format of the RND function varies slightly from one



computer system to another. On many systems you bave to include a value in brackets after "RND" - for example, RND(1). The operation of the RND function will depend upon the value given in biackets.

Later, I will give some examples of the effects of dilferent values for some of the popular personal computers that adopt this format. For the moment, it suffices to say that on most of these systems replacing line 20 of the pievious program with

#### 20 PRINT RND(1)

should give a program that will generate a list of random numbers — each lying between 0 and

## THE ROLE OF THE DIE

How can you use this function RND to simulate rolling a die in a game? The function RND provides us with a number in the range 0 to 1. We require some way of converting this to one of the digits 1, 2, 3, 4, 5 or 6. Let's examine the conversion process step by step.

If RND gives a number in the range 0 to 1 (not Including 1). then 6"RND will give g number in the range 0 to 6 (not including 6). By adding on 1, we would then have a number in the range 1 to 7 (not including 7).

For example: if RND would give 0.217873; then 6\*RND would give 1.30724; and 6°RND+1 would give 2.30724.

By using 6\*RND+1 we can generate numbers in the desired range however, we are only interested in the "integer part" of these numbers l.e. the part before the decimal point. in Basic, there is a function INT that provides the "integer part" of a given number.

INT(3 25) is 3 as 3.25 can be expressed as 3+0.25 INT (-2.6) is -3 as -2.6 can be expressed as -3+0.4

From the second of the examples abave, you can see that the function INT is not quite so straightlaward when dealing with negative numbers. However in our case, we are only interested in positive numbers. When the value is positive, the operation of INT can be described as returning the part

of the number before the decimal point and ignoring the rest. The lollowing program will simulate rolling a die 20 times and print a list of outcomes.

10 FOR 1 = 1 TO 20 20 PRINT INT (6\*RND+1) 30 NEXT 1

A similar program could be wheel by using INT(37\*RND) remember, the possible outcomes are 0, 1, 2, . . . 36.

Clearly, these programs are not of much interest on their own. Later in the series I will show how they can be included in a games playing program.

If you try running the previous programs more than once, you will find that they always produce the same output. A computer game would soon become very boung If it always used the same random numbers each time it ran. We need to be able to adapt the Pseudo-Random Number Generator so that it will generate a different sequence of random numbers each time we 1160 ft

It is this gapect of Pseudo-Random Number Generators that tends to vary areatly from one system to another. I will describe the most common alter-

In those systems where the function is simply expressed as "RND", there will be a keyword RANDOMIZE or RAND that can be included in a program before the first RND function. The inclusuon of a line containing the

appropriate keyword will result in a dilferent set of random numbers being generated each time the program is run. On the Sinclair ZX81, my program for "rolling a die" could be

adapted to: 10 RAND 20 FOR 1 = 1 TO 20 30 PRINT INT (6\*RND +1)

When I introduced systems that used the lormat RND (1), I stated that the operation of the Pseudo-Random Number Generator depended upon the value inside the brackets.

On the Commodore Pet, a program using RND(1) will produce the some random number sequence each time the program is iun, whereas RND(0) will result in a different sequence each time the program is run.

On the Atari, the use of RND(1) will produce a different sequence of random numbers each time the program is run, Rather than being used to generate a

sequence ol rondom numbers, RND(0) returns the value of the most recently generated random

number. It is a great pity that all the

systems are so uconsistent! There are situations when you will wish to select alternative sections of your program depending upon the data input or, perhaps, the value of a random number. Such selections can be made by using an IF statement to test whether a specified condition is true. If the condition is true, then a "nump" is made to a particular section of the program. To illustrate the use of an IF statement I will consider a very simple example.

How can we write a program to simulate tossing a coin - the possible outcomes being a "tail"

The function RND selects a number between 0 and 1 at random. It is equally likely that the number will lie in the lower half of the range or the upper half of the lange. Similarly, when you toss a coin, it is equally likely that the outcome will be a "tail" or a "head". We may therefore decide that if the landom number is in the lower half of the range, it represents a "tail"; and if it is in the upper half of the

lange, it represents a "head". Our program would therefore take the form

if RND · 0.5 then print "TAILS"



#### otherwise punt "HEADS"

We therefore have two alternative sections in the program either we print the message

"TAILS" or we print the message "HEADS". If the condition that RND -0.5 is true, then we print

10 IF BND < 0.5 THEN 40 20 PRINT "HEADS" 30 GOTO 50 40 PRINT "TAILS" 50 END

If the condition RND < 0.5 is true, then the computer wall "jump" ghead to line 40. If the condition is not true, then the jump will be ignored and the computer will continue, as normal, with the following line - in the above example it will go to line 20.

In the case where "HEADS" is printed, the computer must jump" over line 40 - otherwise the message "TAILS" would also be printed. This is achieved by using a 'GOTO' statement. A GOTO statement simply specifies the line number the computer will "jump" to.

The IF statement is sometimes referred to as a "conditional jump" while the GOTO statement is sometimes referred to as an "unconditional jump"

## NEXT ISSUE **SOLVING** PROBLEMS

I have briefly introduced the IF and GOTO statements. Next month. I will describe the use and format of these statements in more detail.

The programs discussed so far have been very simple. You have the knowledge to write reasonably complex programs - it is now just a matter of gaining experience in using that knowledge.

I will work through the steps involved in developing a program for a specified problem next issue.

## NEXT ISSUE



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Example 3! = 3x2x1 = 6 4! = 4x3x2x1 = 24 What are the lowest 3 consecutorials each have the property that they contain the digits 0-9 in

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 Kitchen of Deepcar, Sheffield and E. M. Weston of Todley, Hants, winners of December issue's Mind Routines and Neveral Crossword puzzles, More

champagne is up for grabs this



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#### ACROSS

- Wiring the equipment again while saving the program (9)
   Character lost from the front
- of the tape is fishy (3) 9. Video version of Escape from
- Video version of Escape from Colditz? (5,8)
   Graduate with such com-
- pony Margaret Thatcher, 49 from Rome and the Queen proves more efficient than an
- interpreter (5,8)
  15. Fantastic dream gave tune played on a micro (9,4)
- 16. Fashionable paint to play a fruit machine (3)
- 17. Theatrical second-hand computer (3,3,3)

#### DOWN

1. Machine failure loses a life

## 2. CDC operating system with

- potential (5)

  3. True comic romp around the
- hardware (13)
  4. Deletion of Basic comment
- on a cricket ground (7)

  5. Guy Fawkes peripheral (7)

  7. Gas Panels turned around
- might cover the front of an arcade machine (5,4)
- Failsafe not needed by vide circus player (6,3)
- Criminal prelude to 9 (5,2)
   Working hard in confining a peripheral to a dedicated track (7)
- task (7)

  13 A quick burst of fire in reprisal volley from the
- asteroid player (5)

  14. Writer on the church, 10 of them are usually required to play 9 (5)

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A beginner's guide to plain jargon

ADVENTURE A type of gome in which the player has to take a character role and retrieve a number of treasures or objects by a trial and error process giving instructions to the computer. The "hero" (or player) encounters a variety of hazards often taking the form of dangerous monsters. wizards and animals. Some adventure games are so complex that they take weeks, or months. to solve.

ALCORITHM A process or set of rules to carry out a task or solve a mathematical problem. ARRAY A series of items (data or

information) arranged to form a meaningful pattern.

ARROW KEYS The keys on a computer keyhoard marked with arrows. Used for moving the cursor across, or up and down the V.D.U. acreen.

ASSEMBLY LANGUAGE A longuage huilt up with memory codes designed to make programming easier.

BASIC The most widespread computer language, which is one of the easiest to learn and is used on all microcomputers.

BUG A slang term given to a mistake in a computer program which prevents it from working. It can refer to a mechanical, electrical or electronic defect in a computer. CRIP A tiny piece of silicon

which holds all the components that make up a microprocessor. CHRS A Basic function which codes a computer's graphic symbols. It is followed by a number in brackets, e.g. CHR\$ (68), which is the coded number of the symbol you want the computer to produce.

COMPHTER LANGUAGES Longuages are used to make the computer perform operations. They consist of computer instructions or commands. There are different types of languages for

carrying out different tasks, e.g. business, scientific.

DEBUG The process of locating and correcting errors in a computer program.

DEDICATED CRIP A chip (microprocessor) which has been specially programmed to perform a single or special group of applicatons, e.g. computer games. ROMs ore usually the means by which dedicated chips are developed.

DISC A magnetic storage device. It can be either a hard or floppy disc. Hard discs can usually store more information than floppy discs and are used with mainframe computers.

DISC DRIVE A unit which is connected to the computer used for loading the information stored on discs into the computer.

DOLLAR SIGN See "String" FIRMWARE A program which is stored in a permanent ROM.

GOSUB A Basic command instructing the computer to go to a subroutine in a computer program.

GRAPHICS The name given to pictorial representation of data such os plotted graphs. engineering drawing and, of course, computer games.

HARDWARE The general term given to all pieces of electronic and mechanical devices which make up a computer system, i.e. the actual machines.

HIGH RESOLUTION GRAPHICS A method of using Basic commands to move a drawing head to any position on the screen and drawing a line between two specified points. This facility is available on several makes of microcomputer.

INPUT Information/data which is feel into the computer.

INTEGER A number which does not contain a decimal point, i.e. a whole number.

K Ahhreviation for Kilobyte.

A beginner's guide to plain largon

KILOBYTE A measurement of memory capacity, 1024 bytes of memory. So 8K is equivalent to 8192 bytes.

LANGUAGE See "Computer Language".

L.C.D. (Liquid Crystal Display) A display containing liquid crystals which light up when electricity touches them. Used in calculators and watches.

L.E.D. (Light Emitting Diode) Provides a simple display and consists of an electron tube which lights up when electricity is passed through it. Used as an alternative to liquid crystal.

LINE NUMBER Refers to the number assigned to a line or row of characters contained in o computer program.

LOAD Putting information from quailiary storage into internol storage of a computer. It can be either a complete program or any data. When you load a program you put the contents of the program into the computer's memory from storage either on a disc or a cassette.

LOOP A Basic tunction referring to the repeated execution of a series of instructions for a fixed number of times.

MACHINE CODE The term used to refer to symbols or numbers assigned to parts of a machine. It is the same as operation code which is the symbol telling the computer which operation to perform. When a game is written in machine code it makes everything move much more quickly.

MAINFRAME COMPUTER The jargon word used to describe a very large computer. MICROCOMPUTER A tiny com-

puter (as the nome suggests) consisting of hardwore and software. The main processing blocks are made of semiconductor integrated circuits.

MICROPROCESSOR Another name for a chip.

NUMBER CRUNCHING The operation in computing which corries out the arithmetic and logical processes which information has to go through.

PEEK A statement used in Basic which ollows you to read the contents of a specified memory

PERIPHERAL INTERFACE ADAPTOR (P.I.A.) An adaptor which is incorporated in the chip and makes peripheral equipment interfacing easier.

PERIPHERALS Equipment which is used with a computer, e.g. printers V.D.U.s and disc drives. POKE An instruction used in most versions of Basic allowing you to store integers in a specific place in memory.

R.A.M. (Random Access Memory) This is a memory chip which you can load programs and data to and from

RANDOM NUMBER A number selected of random from an ordered set of numbers.

R.O.M. (Read Only Memory) A memory chip which can only be read from and not written into. ROUTINE A set of coded computer instructions used for a particular function in a program.

SOFTWARE Another name for computer programs. It can also refer to computer documentation.

STATEMENT An instruction in a computer program.

STRING A connected sequence of characters, words or other elements usually symbolised with the (dollar) sign.

SUBROUTINE A computer program routine that is translated separately. SYNTAX The name used to refer

to sentence structure rules of a programming language. USER PORT The entry channel to

which a dota set (set of similar detal is attached.

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## A GUIDE TO THE LOW-COST COMPUTERS //

ACDRN ATDM Cambridge based Acorn Computers manufectures the Atom machine which has a memory capacity of 2K, but it can be upgraded to 12K

it most be plupped into a television and re available in sichs) kit form or ready brill. As a kut it costs £120 for the 2K commuter or P150 for the Bnished product For a more \$229 An kitl and \$250 completed.

which cost between F69 and £750

APPLE The Apple has a solid software bese for both business and entertainment applications. The mechine comes with a memory capacity ranging from 8 48K. You can buy joysticks and paddles to ping in for use with computal gemes Coloni graphics can be used with a colour television The 48K mechine costs £695 and is

obtainable from Apole Computer U.K., formaily Macrosanse which is based in Hamel

ATARI 400/900 Most of the software for the Atan microcomputers are games or educational, with business applications only recently being introduced

The basic 400 with 16K RAM costs £340 direct from Aten's UK distributors. via London-based Ingersoll Electionics. The 32K version sells to: £395 Peripherals to: the machines, tike disc drive units and cussette recorders cen also be obtained The 800 is expandable to 48K and the 16K machine sells for PB45.

SEC COMPUTER The computer edopted forthcoming sames is based on the Acorn Proton The BBC has developed its own Resid to be used on the machine. Minimum memory is 18K RAM, maximum being 32K Present plans for the machine are dual guipose, both business and games Ontinnel extras include roysticks, paddles, disc drives and a cassette for tape loading Pince is pint at £235 for the 16K computer and £335 los the 32K version.

BAI This is a personal computer made by Date Applications for both business rise end home enterteinment. The U.K. system (it is made in Belgium) has 48K RAM as well as full colour and sound commands Date Applications is based in Dirence ster. Gloucestarshire. The 48K system now costs £595

NASCOM There are two Nescoms everlable at the moment, both can be used los business and games. The Nascom 2 is the with a Basic interpreter.

It can be bought in lot form and off the shall complete. The ket is \$125 Inc 1K BAM and £140 to: the finished 1K product, £225 will secree on 8K for Nescoms are available Irom Werwick-based Luces Logic

NEWBRAIN This is e hand held computer bracket For 2K RAM von pay £159 upwards and it is expendable to 20K of memory Hobbwets often out for this mechine ceneral business and for playing games. An expansion unit is available which supports Singay disc duyes a nunter and a visne display nort it is everlable from the Grandy

DHIO SCIENTIFIC Dino Scientific (OSI) makes the Superboard which is aimed at the hobbyist merket Its memory capacity starts at 4K RAM and is expandable to 32K if you bny the add-on board

Other machines in this family include the Challenger 1 and 4. These ere essentially, cased varsions of Superboard The Challenger 4 is the cheapest of these et £575 and includes colour and sound options

PFT Made by Commodore Business Machines, the Pet ranges from 8K RAM to 30K RAM. It is used mostly by small bosinesses for opneral applications but has a hefty hobbyest following it is available from Commodore of Slough at a starting ours of P460 Compatible parigharals are everlable to: the Pet, including disc drives, cassettes for loading topes and printers.

SHARP MZ-80K Popular with both business and home users, the Sharp's memory cenacity starts at 19K and has a top limit of 48K it comes with a monitor and a cassette recorder hult onto the kayboard unit. Disk drives are also available. Manchesterhased Shain Flectronics have a racom manded retail price of £460 for the 48K nort

SHARP PC-1211 The smellast computer in the Sharp range Sherp classifies it as a loading and costs nowerds of £85.

SINCLAIR There ere two types of Sinclair's mici pcomputar available tor inder £100 Sinclas smally biguight the microcomputer into the hame. The mechines are ideal for lessmon the radiments of computing but ere limiting graphically. The ZX80 has tK of memory and is expendable no to 8K, but is no longer in production. The ZX81 sells for E49 95 lot 1K in lot form or £69 95 ready assembled The 16K RAM packs cost

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STREETER The Furdy Sourceror is a home computer with a sizeable games following but it is one of the main expensive of the microcomputers, coxting upwerds of £749. Memory amount ranges from 48K to 55K and there is a plug-in ROM pack for extra conacity. Disc drives add visual display nort. are an additional cost. Spicarer's can be ebtained from a Cornish from Liveport of St

TANDY TRS.40 Tandy's TRS 80 Model 1 is a machine which is often used for gemes and is wall-supplied with software for both entertainment and business applications Its mamory capacity goes from 4K to 16K but there is an expansion unit available upgrading if to 48K if you want the extra mamory. The Model I is the cheapast of

The Model 1 costs £459 but comes complete with a mentor to ass as a VOU. and a cassatte. The Modal III is an integral umi made up of a kayboard, 12' acrean and two slots for 50' discs. It engls from P499

eraduce the Microtan 85, a microcomputer for games and personal use. Ilka household accounts, it comes in but form and is expandable from an initial 1K memory up to 48K of RAM. The Micintain 65 costs £79.35 for the TK kit, or F90.85 assambled Tannenne is besed in Elv. Cambudgeshire

TANGERINE Tangenne Computer Systems

TI-99/4A This computer has recently been re-leunched by Taxae Instruments II consists of a superate keyboard with prephics facilities in full colour and now plags in to a If K telausine Software evaluate for it and educational but the firm has recently computer. It has 16K RAM and uses topes. discs or plug-in games cartridges. You can buy one of these from Bedford-based T1 loi £299 oi from your local deelers

VIC-20 The VIC is the much problemsed baby of the senge of microcomputers from Commadate of Slongh At £185 it is one of the cheepest Deliverion to dealers have inst started. The VIC has full colour prephics on a colour TV, and there are joysticks available Although Commodere are plant ging the basiness use of the machine it is lipped to be a hot games compuler because of its colons practice and low

VICEO GENIE The Genie is made by EACA, and in a popular games machine. If le compatible with the Tandy TSS-80 Model 1 With 16K to 48K RAM there are disc drives evadable. The basic unit costs from £369 and is eveilable from Lowe Electronics of Matlock in Gerbyshire

GENIE 1 The raplacement computer for the Video Genie is now available. The Genie 1. and has full raper and lower case, a machina language monitor, additional Basic, has a sound unit and is cassette based 11 is baing simad at the serieus hebbyist market. and costs £229 A disc varsion is available. called the Genre II and sails for £310 for the unit. £199 for the expansion box needed.

U.K.101 This machine comes in aither kill form or ready built with memory capacity of 4K to 40K (with an expansion board) it contains television and cassette interfaces so you don't need a V.O U Tha U K 101 is a popular computer for playing gernes and there is a int of software around for it. The kit costs £149 for 4K, ready built it sells for F199.



TANDY TRS-80 COLOUR COMPUTER Tundy's fatest addition to its range of computers is the Extended Besic Micro Colour Computar, (or TRS 80 Colour Comonter for Short). It is available with either 16 or 32K of mamory and coats £449.

The actual computer unit consists of a keyboard which can be plugged into any television set flus aimed at both business and games users and Tandy has bought out a veriety of instant loading gemes progrem packages for the machine

Joysticks needed to play some of the games are extra and cost £17 95 a par The colour computer can be obtained from Tandy stores nationwide.

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#### Can you save Middle Earth by rescuing Frodo from Shelob's lair . . . ?

#### Tolkien's

## LORD OF THE RINGS

Lord of the Rings is an entirely new type of game comb a little of the principle of the Adventural type of game using words as spells, etc., a little of the Quest principle of moving around the frooms plus actual graphers showing the vanous flevels, walls, doors, nasters and votresef. Fordio.

The appeal of the game is thell it combines skill and chance, so thei Though developing strategies are Important, there is no guarantee that having learnt a strategy it will work twice!

The name is an adaption of Tolkien's book 'The Lord of the Rings', spell words ectually being taken from the book as sie the characters. Tolkien enthusiasta will not need convincing of the necessity

of saving Middle Earth by escaping from Shelob's Laii; those without this background knowledge will have to play a few games before they become addicted!

In your quest to cast the ring into the Crack of Doom to

destroy its evil power you will travel along and dangerous road. The Lati is on meny levels, so you must find the stere, and beware of the dever nasties, monsters and dwarfs which can delect you from a distance and rush for your gold, which you need to babe. There are secret lunnels monsters formbs and

During your travels you can meet Shelob herself a Flany Balrog, Lord of the Nazgul, e Hideoue Hill-Troff Chief, e Nume let from the Far Herrart, Hissiano Gollum e Howling Ward, e Rarmw-Winht and all those characters of the spell

mercun regim and an roose characters or the spell WOOS.

The game, though easy to ectuelty play is complicated in itself with many and varied happenings elong the way. But its adventage is that all the time you can see and manpulate.

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provisions, and if you are lucky assistance from a Dryad as well as counsel from the Great Oracle. If you meet up with the Nymph, hang on to her, as she is a

great guide through like forest se well as helping to fight like draaded Trois, But be careful not to upsel her as she can easily turn her magical power onto you with a curse From time to time you will meet wolves, lizards and snekes

Sometimes you will be bitten but other times you will get away. Fdoo is most important to you, but you could be lucky in finding some in the forest and also be lucky in finding the magic

Jalaman which will ward off the wicked Necromances. The Satyre are nastles, to be avoided, but the real nasty is

the spider, for if you don't run from him — and lest. It is the end The Diagon is most important, and you can either run of

light But to get a decent fighting ability rating, to anable you to light your way back after reacuing the Princess, you have to Run from the Goblins, or you will be enslayed, to be sold or

freed only on payment of a rensorr More baddes in the form of the Trolls, which come in two versions including the warrior trolls which are your big risk all

the time, and an enchanted sword All the way through are degrees of your ability, which is either diminished or increased depending on the action you are

Eventually you could make it to the castle and even inscue the anness, but then you've quessed, you have to fight you way back sosin!

it's a farlastic game, which can be played over and over again, such is its vanetion, and so do not confuse it with oth

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